GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIV. No. 3155.] LONDON, OCTOBER 31, 1923. [75TH YEAR. PRICE 1s.

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BENZOL PRODUCTS:

Pure, 90's and Standard Benzol. — Pure and Commercial Toluol. — Light and Heavy Solvents.
65 per cent. Crude Benzol.

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COMPLETE INSTALLATIONS.

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NO WASTE OF WATER.

IMMENSE SAVING in LABOUR COSTS.

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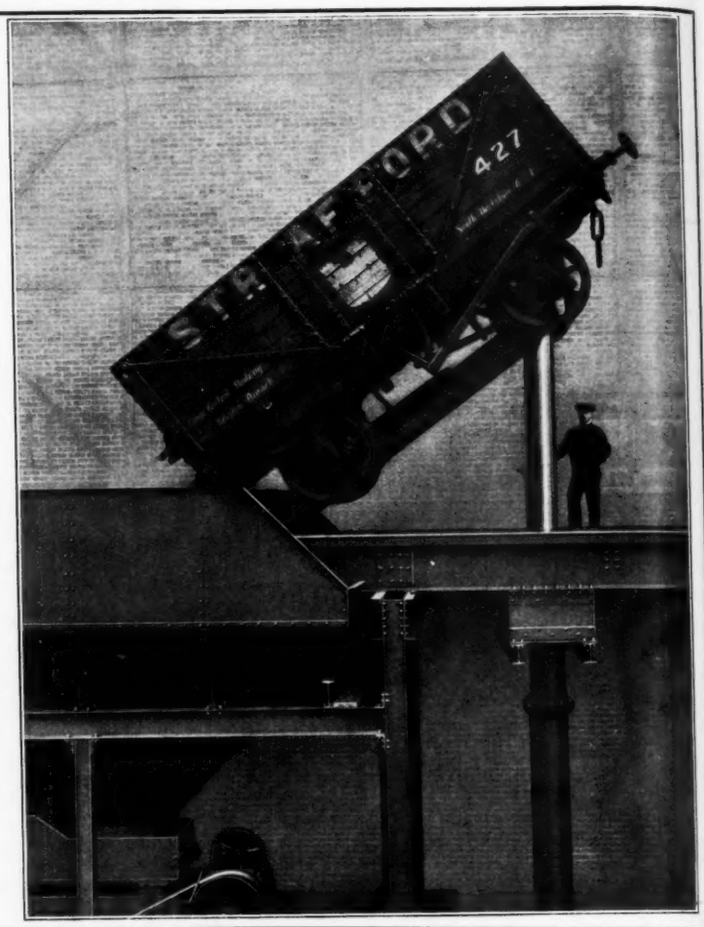

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Gasholders with or without Guide Framing

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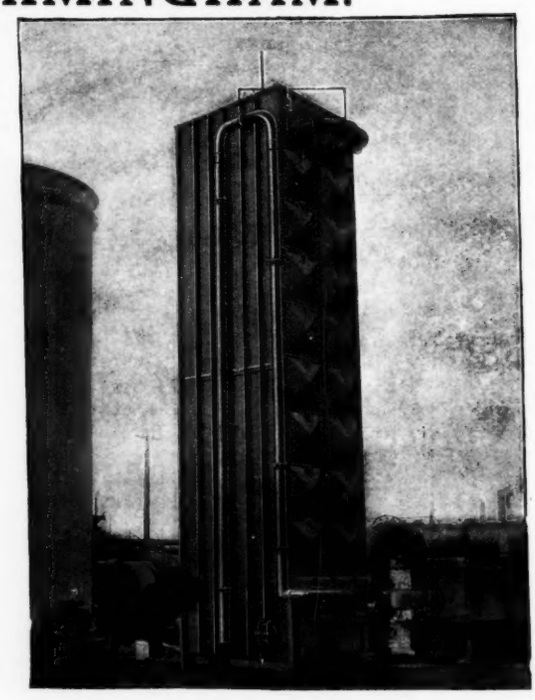
Complete Gas Plants.

Steel Pipes welded or rivetted.

Tanks, pressed steel, also rivetted or welded.



"Atlas" Condenser.

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Sulphate of Ammonia Plant

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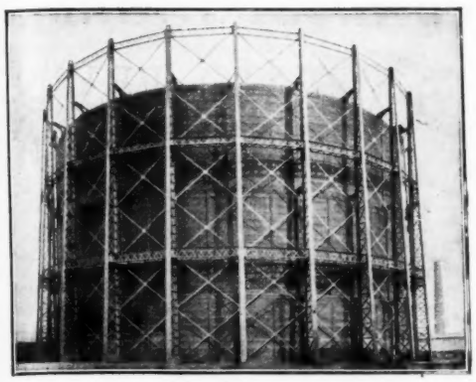
Naphthalene Plants, pressed and pure.

Stills for Tar, Ammonia, Benzol, & Phenol.

Condensers & Dephlegmators

ALL MADE IN OUR OWN WORKSHOPS.



GASHOLDERS and TANKS
of any size or type.

CONDENSERS—Water Tube,
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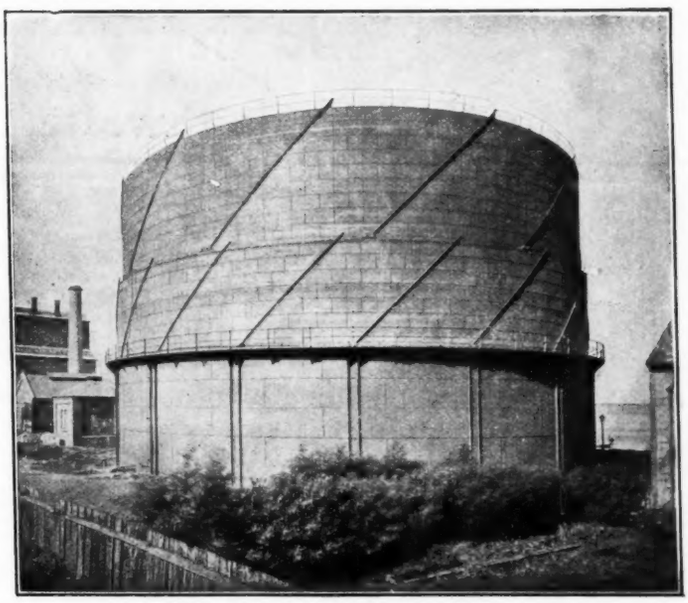

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STRUCTURAL WORK of every
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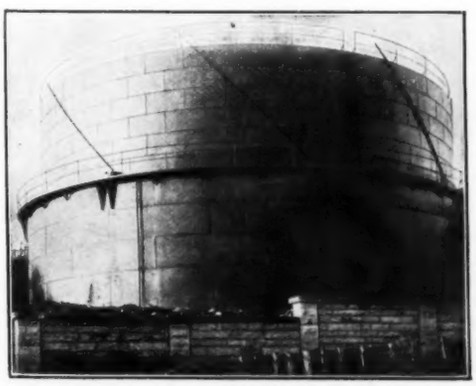
STEEL RIVETTED PIPES.



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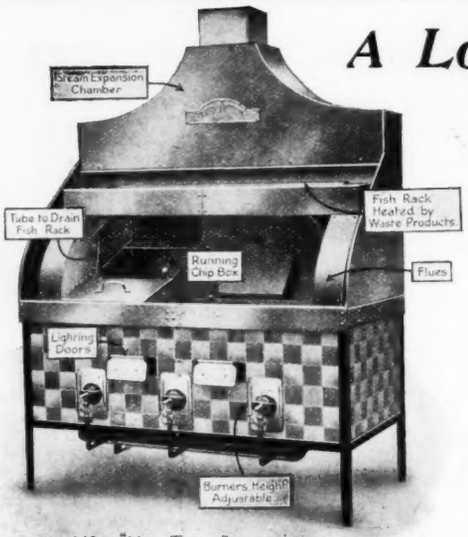

No 3. "New Triton". Tile/Steel Type.

A Load Worth Cultivating!

FISH & POTATO FRYING

by the

"NEW TRITON"

Gas Range.

See Article in the "GAS SALESMAN" for March pp. 40 & 41.

Full Particulars from

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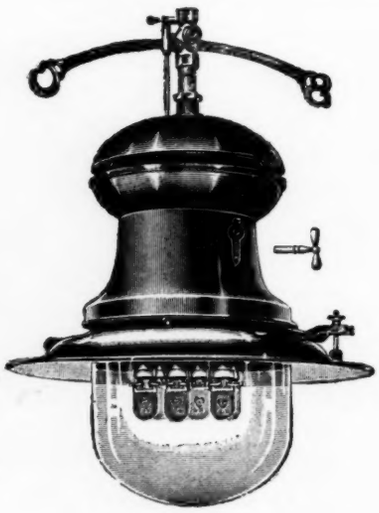
THE NEW "UKAY"

INVERTED LAMP

(with superheater)



embodies the latest improvements in low pressure lamps.

Thousands have been installed all over the country for general outdoor and indoor lighting including Streets, Railways, Public Halls, Markets, Shops, &c., &c.

We have large stocks at your disposal in a wide range of types and sizes, and at prices which show a smaller advance on pre-war rates than most other lighting media.

Write for full particulars.

The
NEW UKAY
Inverted Lamp
(WITH SUPERHEATER)
BRITISH MADE
For Shop Front, Street & General Outdoor Lighting

Falk, Stadelmann, & Co LTD
VERITAS LIGHT WORKS
LONDON · GLASGOW · MANCHESTER · BIRMINGHAM

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(Works cover 4½ Acres.)

Actual Makers of—

GLASSWARE—Clear, Opal, or Coloured—for all lighting purposes.
STAMPINGS AND PRESSINGS in all Metals.
COINS, MEDALS, TOKENS, &c.
LAMPS (Oil, Spirit, and Acetylene) for Mines, Quarries, Railways, Engineers, &c.
SPECIAL FURNACE CEMENT for Repairing and Rebuilding Furnaces, Coke Ovens.

THE

"SIMPLEX"

WATER GAS PLANT

(Incorporating the "Sydenham" Grate)

BLUE & CARBURETTED.

SPECIALLY SUITABLE FOR SMALL & MEDIUM-SIZED WORKS.

NO OIL REQUIRED
FOR ENRICHMENT.
EFFECTIVE.
SIMPLE TO OPERATE.
LOW COST.
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WILSON'S (CONT-INT.) VERTICALS

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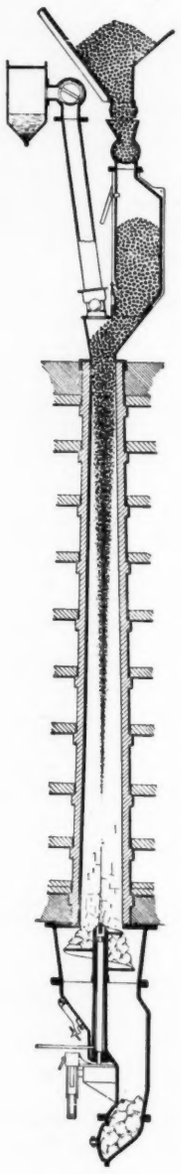
RENEWALS &

NEW BENCHES

GAS-WORKS ERECTED COMPLETE.

R. & G. HISLOP
Underwood House,
PAISLEY

Glover-West System



In the Tests of the Fuel Research Board on the Carbonization of Mitchell Main Gas Nuts the following results were obtained:

TEST NUMBER	D	E	F	G	Increases
COAL—tons per retort per day	2·52	2·48	2·56	2·48	Constant
STEAM per cent. on coal carbonized ...	Nil.	5·06	12·44	20·53	—
GAS—cu. ft. per ton ...	13,100	16,430	20,060	22,580	72%
cu. ft. per retort ...	33,012	40,746	51,353	56,000	70%
THERMS PER TON	71·3	84·9	95·7	104	46%
Therms per retort per day	180	211	245	257	43%
Calorific value B.Th.U. gross ...	544	517	477	460	—
Inerts in gas, per cent.	11·4	11·0	10·8	10·6	Nil
COKE—total make in cwt. per ton of coal ...	14·5	13·9	13·3	13·2	Less by 1·3 cwt.

This means

70% of water-gas can be added to the results of dry distillation with

NO EXTRA CAPITAL COST

for water-gas plant

NO EXTRA LABOUR COST

NO DECREASE IN COAL CARBONIZED

9,480 cu. ft. of additional gas is made from 1·3 cwts. of coke

NO INERTS ARE ADDED TO THE GAS

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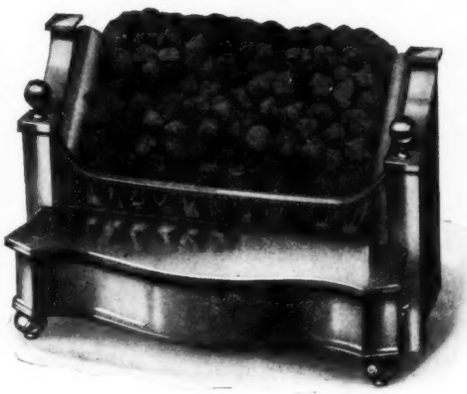
The latest triumph for gas



The 'Cinderella' Gas Fire

The 'Cinderella' Fire will greatly help your gas sales. It disposes of the last objection to the installation of a gas fire and meets every requirement of even the most fastidious consumer.

This fire opens a new era in the history of gas heating. It appeals to a wider range of consumers than any other gas fire and commands instant admiration and attention wherever installed.

Fit a 'Cinderella' in your Showroom and note its wonderful power of attracting consumers and compelling sales.

Special features of the 'Cinderella' are :—

It fits easily into any interior.

Only a few seconds are required to place both sets of radiants in position.

It preserves the symmetry of the original grate at all times.

It is unequalled for brilliancy.

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CYLINDRICAL STATION METERS

IN CAST IRON CASES — STANDARD PATTERN

FRONT VIEW.

Fitted with Water Line and Pressure Gauges, Overflow, Thermometer, Index, with or without Clock and Tell-tale as required.

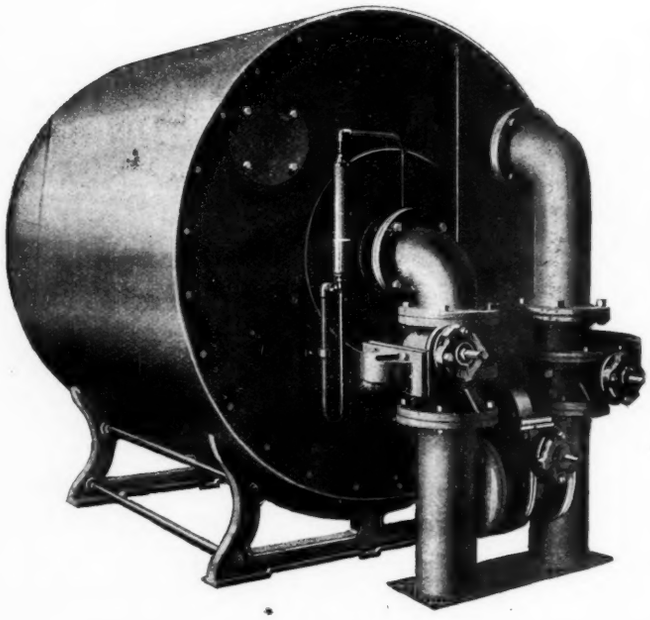
BUILT IN SIZES
TO PASS FROM
600 TO 30,000
CUBIC FEET PER HOUR

QUOTATIONS WITH DRAWINGS & SPECIFICATIONS FURNISHED ON APPLICATION.

Our Station Meters operating in all parts of the world are passing over

$15\frac{3}{4}$ MILLION
Cubic Feet of Gas per hour.

REPEAT ORDERS testify to their HIGH QUALITY



BACK VIEW.

OLDHAM
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Phone: 340
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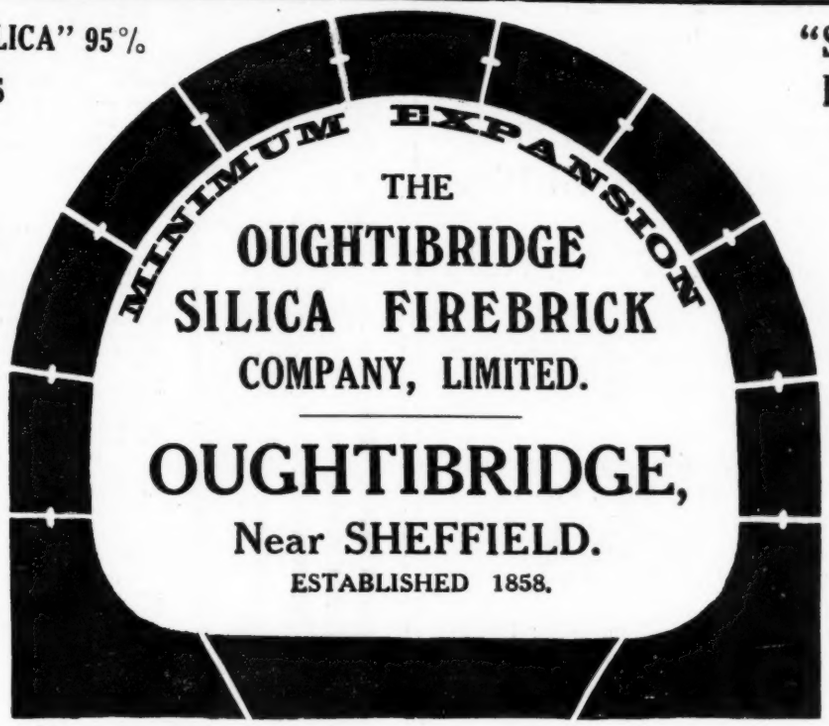
"S.P. SILICA" 95% RETORTS AND FOR BYE PRODUCT COKE OVENS.

Plastic Silica Cement.



"SILCO" RETORTS 90% SILICA.

Silco Cement AND Ground Ganister.

Highest Grade Silica Bricks and Blocks for Gas Works.

1838-1923

Eighty-five years' experience
in the Design, Manufacture and Erection of

Condensing, Cooling, Distilling, Drying, Evaporating, Heating, Purifying and Scrubbing Plant

is at your disposal.

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'Grams: "BLAZON, GLASGOW," "MULTIVAP, HOLB., LONDON."

(No. 8)

Alder & Mackay, Ltd.

Established 1850.

Manufacturers of Green's Patent UNDERGROUND WET METER.

Especially suitable for measuring STREET LAMP consumption.

ALSO for Market Stances and Residential Houses where these may be a long way from the Main Pipe.

This Meter can be fixed at any convenient point close to the Main Pipe, and in the case of a long service supply any leakage taking place in it, the gas would be measured as it left the Main Pipe.

This METER is always fixed outside; therefore in case of FIRE it is always accessible.

MADE IN SIZES FROM 3 LIGHTS TO 100 LIGHTS

All particulars on application.

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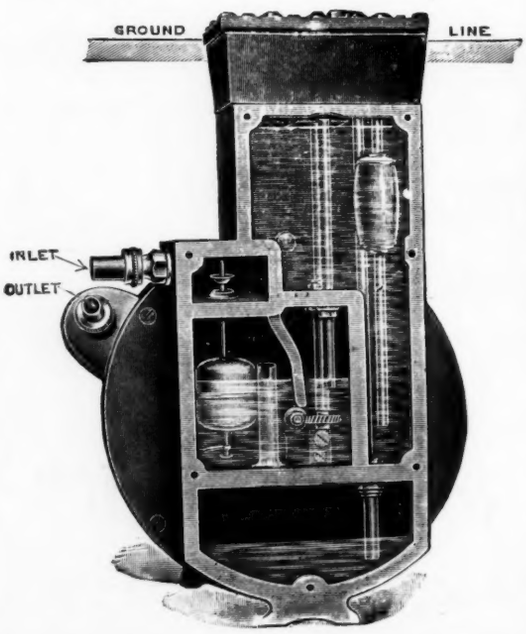

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TESTED TUBES

IN BRASS, COPPER, NICKEL SILVER & ALUMINIUM

Send to Serck

OUR Tube Drawing Mills, where over 100 draw benches are installed, produce yearly many thousands of miles of Tubes of all kinds in Brass, Copper, Nickel Silver, and Aluminium.

Long experience and specialised methods combine to ensure the essential qualities of lightness and strength to an unsurpassed degree in SERCK TUBES, which are guaranteed to represent the highest standard of material and workmanship attainable.

Manufactured in all lengths up to 20 ft., and any gauge from 18 S.W.G. to a few thousandths of an inch.

Send us your enquiry— we shall be glad to quote.

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ESTABLISHED 1855.

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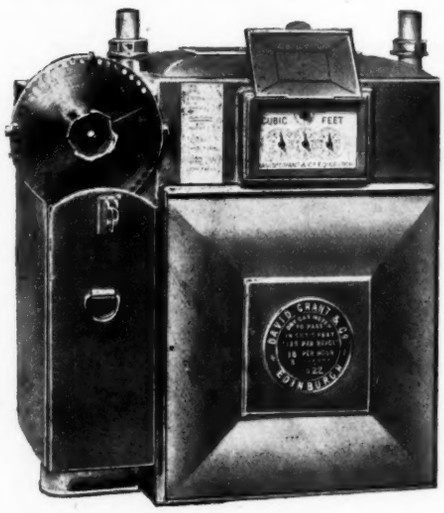

WET and DRY GAS METERS,

STANDARD DRY METERS,

STATION METERS, PRESSURE GAUGES, SYPHON PUMPS.

SLOT METERS Simple, Strong, Compact, Accurate.

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Orders Received and Plants Erected since 1919.

		Cubic ft. per 24 hrs.
RUNCORN	1 Set	300,000
HOLYHEAD	1 "	100,000
NEWARK	1 "	300,000
HUNLEY	1 "	150,000
EAST GRINSTEAD	1 "	200,000
SANDOWN	1 "	100,000
GRANTHAM	1 "	300,000
HEYWOOD	1 "	300,000
NORMANTON	1 "	100,000
NORMANTON	1 "	100,000
ENNISKILLEN	1 "	50,000
LLANDUDNO	1 "	300,000
SWADLINCOTE	1 "	200,000
IRTHLINGBOROUGH	1 "	100,000
KNOTTINGLEY	1 "	100,000
NEWCASTLE, STAFFS.	1 "	300,000
CONWAY	1 "	100,000
BURNHAM	1 "	75,000
BURNTISLAND	1 "	200,000
BRIDGEND	1 "	100,000
LIMERICK	1 "	300,000
COLWYN BAY	1 "	300,000
CARMARTHEN	1 "	100,000
KIRKBY-IN-ASHFIELD	1 "	100,000
KELSO	1 "	100,000
OTLEY	1 "	100,000
BLANDFORD	1 "	100,000
GRANGE & CARTMEL	1 "	100,000
TIVERTON	1 "	100,000
FORMBY	1 "	100,000
KIDDERMINSTER	1 "	300,000
KIDDERMINSTER	1 "	300,000
TONBRIDGE	1 "	500,000
LARNE	1 "	100,000
KELTY	1 "	150,000
HORLEY	1 "	150,000
EAST DEREHAM	1 "	100,000
ABERYSTWYTH	1 "	200,000
HARPENDEN	1 "	300,000
KILDWICK	1 "	200,000
HASLEMERE	1 "	150,000
SOUTHBANK	1 "	300,000
MIRFIELD	1 "	300,000
WHITBY	1 "	300,000
FEATHERSTONE	1 "	100,000
FEATHERSTONE	1 "	100,000
GUERNSEY	repeat order 1 "	500,000
THIRSK	1 "	100,000
NEWARK	repeat order 1 "	300,000
LLANDUDNO	repeat order 1 "	300,000
HEXHAM	1 "	150,000
HEXHAM	1 "	150,000
SELBY	1 "	150,000
SELBY	1 "	150,000
WELLINGTON (SALOP)	1 "	200,000
PORTHCAWL	1 "	200,000
TEIGNMOUTH	1 "	200,000
LETCHWORTH	1 "	300,000
LETCHWORTH	1 "	300,000
COLWYN BAY	repeat order 1 "	300,000
WHITSTABLE	1 "	100,000
JERSEY	repeat order 1 "	300,000
DURSLEY	1 "	150,000
DURSLEY	1 "	150,000
CIRENCESTER	1 "	100,000
CORING-ON-THAMES	1 "	75,000
CASTLEFORD	1 "	300,000
HAVERTON HILL-ON-TEES	1 "	100,000
HAVERTON HILL-ON-TEES	1 "	100,000
BATLEY	1 "	300,000
BATLEY	1 "	300,000
HASLINGDEN	1 "	200,000
OSSETT	1 "	300,000
SEATON	1 "	75,000
SEATON	1 "	75,000
TAYPORT	1 "	75,000
RYDE, ISLE OF WIGHT	1 "	150,000
RYDE, ISLE OF WIGHT	1 "	150,000
KNOTTINGLEY	repeat order 1 "	100,000
NEWQUAY	1 "	75,000
NEWQUAY	1 "	75,000
PONTEFRACT	1 "	200,000
PONTEFRACT	1 "	200,000
CONGLETON	1 "	200,000
CORDOBA, SPAIN	1 "	200,000
REUS, SPAIN	1 "	100,000
KOBE, JAPAN	1 "	500,000
KOBE, JAPAN	1 "	500,000
KOBE, JAPAN	repeat order 1 "	50,000
KOBE, JAPAN	1 "	50,000
KOBE, JAPAN	repeat order 1 "	500,000
MOUTIER, SWITZERLAND	2 "	300,000

		Cubic ft. per 24 hrs.
FLEETWOOD	1 Set	300,000
PRESTONPANS	1 "	100,000
PRESTONPANS	1 "	100,000
CORK	1 "	300,000
SELKIRK	1 "	150,000
MORLEY	1 "	200,000
SHEFFIELD	1 "	500,000
SHEFFIELD	1 "	500,000
BATHGATE	1 "	150,000
LITTLEBOROUGH	1 "	200,000
NEWPORT, ISLE OF WIGHT	1 "	150,000
SCUNTHORPE	1 "	300,000
SCUNTHORPE	1 "	300,000
LANGLEY MILL	1 "	300,000
BOLTON	1 "	500,000
WALTON-ON-THAMES	1 "	150,000
WALTON-ON-THAMES	1 "	150,000
KETTERING	1 "	300,000
BISHOP AUCKLAND	1 "	150,000
BISHOP AUCKLAND	1 "	150,000
DRAYCOTT	1 "	200,000
BEDFORD	1 "	750,000
BEDFORD	1 "	750,000
COLNE	1 "	500,000
MUSSELBURGH	1 "	300,000
AMBLESIDE	1 "	100,000
LEYLAND	1 "	200,000
LEYLAND	1 "	200,000
WISBECH	1 "	150,000
ALTRINCHAM	1 "	200,000
ALTRINCHAM	1 "	200,000
CRANGE-OVER-SANDS	repeat order 1 "	100,000
DERBY	1 "	500,000
GRAVESEND	1 "	300,000
KEITH	1 "	50,000
CARNARVON	1 "	300,000
ELLAND	1 "	300,000
ELLAND	1 "	300,000
HEMSWORTH	1 "	100,000
SOUTH ELMSALL	1 "	100,000
HINDLEY	1 "	300,000
HINDLEY	1 "	300,000
ABERCARN	1 "	150,000
CRANGEMOUTH	1 "	200,000
DUNS	1 "	50,000
CONWAY	repeat order 1 "	200,000
BUNCAY	1 "	50,000
HALIFAX	1 "	500,000
HALIFAX	1 "	500,000
HALIFAX	1 "	500,000
HALIFAX	1 "	500,000
BATHGATE	repeat order 1 "	150,000
ANSTRUTHER	1 "	75,000
INVERURIE	1 "	75,000
MALDON	1 "	100,000
STONEHAVEN	1 "	100,000
MOFFAT	1 "	50,000
CIRENCESTER	repeat order 1 "	100,000
REDCAR	1 "	300,000
REDCAR	1 "	300,000
EGREMONT, CUMBERLAND	1 "	150,000
TRANENT	1 "	75,000
ALDERNEY, C. ISLANDS	1 "	50,000
ALDERNEY, C. ISLANDS	1 "	50,000
WICK & PULTENEYTOWN	1 "	75,000
ST. MARY CHURCH, TORQUAY	repeat order 1 "	200,000
ST. MARY CHURCH, TORQUAY	repeat order 1 "	200,000
ABERCARN	repeat order 1 "	150,000
BANGOR	1 "	200,000
BANGOR	1 "	200,000
WELLINGTON, SALOP	repeat order 1 "	300,000
SLEAFORD	1 "	150,000
CORING-ON-THAMES	repeat order 1 "	150,000
LURGAN	1 "	200,000
LURGAN	1 "	200,000
WHITSTABLE	repeat order 1 "	200,000
HARPENDEN	repeat order 1 "	300,000
HASLINGDEN	1 "	200,000
BISHOP'S CASTLE	1 "	50,000
EYEMOUTH	1 "	50,000
LAURENCEKIRK	1 "	50,000
COLNE	repeat order 1 "	500,000
SUZUKI & CO., JAPAN	1 "	500,000
SUZUKI & CO., JAPAN	1 "	500,000
LOUHANS, FRANCE	1 "	150,000
ST. GERMAIN, FRANCE	1 "	500,000
THIZY, FRANCE		
FUSION DES GAZ	1 "	100,000
LES ACIERIES D'ESTAMPACE	1 "	100,000
BELLEVILLE, CANADA	1 "	300,000
LILLE (with Waste Heat Boilers)	1 "	500,000
LILLE (" " ")	1 "	500,000
SOUTHBANK	repeat order 1 "	400,000

PROMPT DELIVERY CAN BE GIVEN OF PLANTS FROM 50,000 to 1,000,000
Cubic feet per 24 hours.

TULLY GAS PLANTS, LIMITED,

40, Norfolk Street, Strand, London, W.C. 2.

Telegrams: "DAMPER, ESTRAND, LONDON."
Telephone: CITY 4047—8 (2 lines).

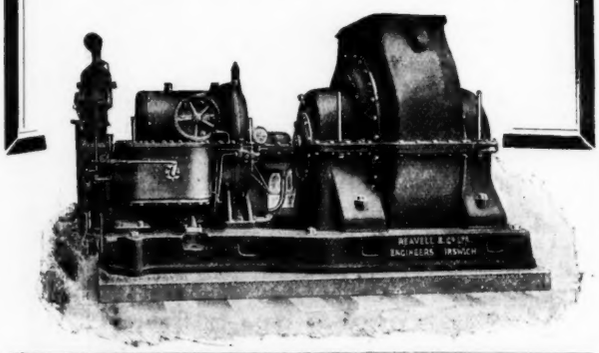
Works: MILLGATE, NEWARK.

GAS COMPRESSORS & EXHAUSTERS

We supply a complete range of Compressors & Exhausters for gas and air, suitable for all purposes connected with the Gas Industry, including Turbo Compressors for large capacities, as illustrated below.

WRITE TO DEPARTMENT "J" FOR PAMPHLETS GIVING FULL PARTICULARS.

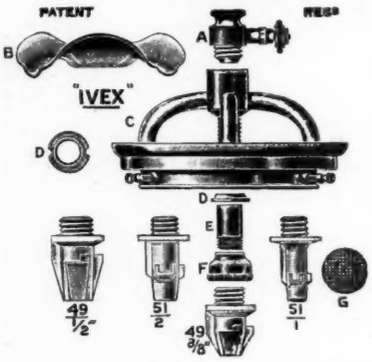
REAVELL & CO., LTD.,
RANELAGH WORKS, IPSWICH.



PODMORE'S

Superheated Dustproof
BUNSEN (DOMESTIC) BURNER.
Based on Scientific Principles.

THE Burner for HOUSING SCHEMES
The "IVEX" Burner.



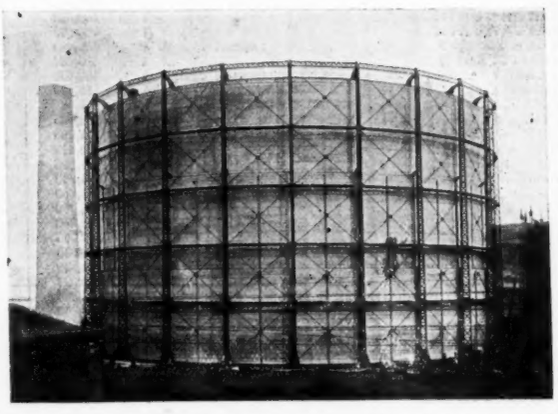
To Take
Deep (54 mm.) Universal Mantle,
Ordinary Mantle,
No. 2 (or medium) Mantle,
Bijou Mantle,
Bisco-Mundus Mantle,
or
Graetzin Mantle.

All Parts Standardized.
Every Part Interchangeable.
One Standard Size Globe for all Mantles.

A. E. PODMORE & CO. (A. E. PODMORE, Proprietor)
Gas Lighting Patentees, Engineers, & Contractors,
34, Charles Street, Hatton Garden, London, E.C. 1.
Telegrams: "Promerope Smith, London." Telephone: No. 6600 Central.
A.B.C. Code 5th Ed. used. Marconi, International Code.

W. C. HOLMES & CO., LTD.,
ENGINEERS,
HUDDERSFIELD.

Telegrams:
"Holmes, Huddersfield."
Telephone:
Huddersfield 1573.

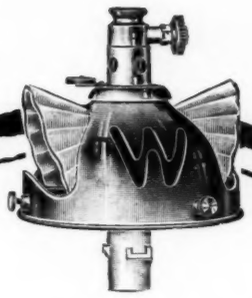


Gasholder erected at Huddersfield, 1914.
(Capacity 4½ Million Cub. Ft.)

Manufacturers of complete installations for

GASWORKS, COKE OVENS, and BY-PRODUCT PLANTS.

ENQUIRIES INVITED.



The "WALNEY" Burner.

There are Burners —and Burners

The Welsbach Inverted Burners are the "something better" in the way of really high-class and efficient gas appliances. Many burners of inferior make do not effect a satisfactory mixture of gas with the primary air necessary for perfect combustion. The Welsbach Burners are especially designed to ensure proper mixing and thereby give a vastly increased illuminating power. Made in Aluminium, Polished Brass, Red Bronzed, Steel Bronzed, or Oxidised Copper, they are extremely high-class products, excellent in construction and finish.

WELSBACH
BRITISH MADE
BURNERS

If you have not already got a copy of our new 1923-24 Catalogue, write for one to-day to - - THE WELSBACH LIGHT CO., LTD., Welsbach House, Kings Cross, London, W.C.1.

The "NORE" Burner.

The "NORE" Burner.

WELSBACH HOUSE IS ALWAYS A LIGHT HOUSE

P.P.S.1903.

Kent's Sensitive Type Gas Meter Recorder.

This Recorder works in conjunction with a Venturi Tube or Orifice Fitting, and has been developed for the purpose of measuring the flow of gases which are passed at low static pressures, such as the gas in boiler flues, producer gas from retort houses, etc. It is accurate on flows down to one-eighth of the maximum.

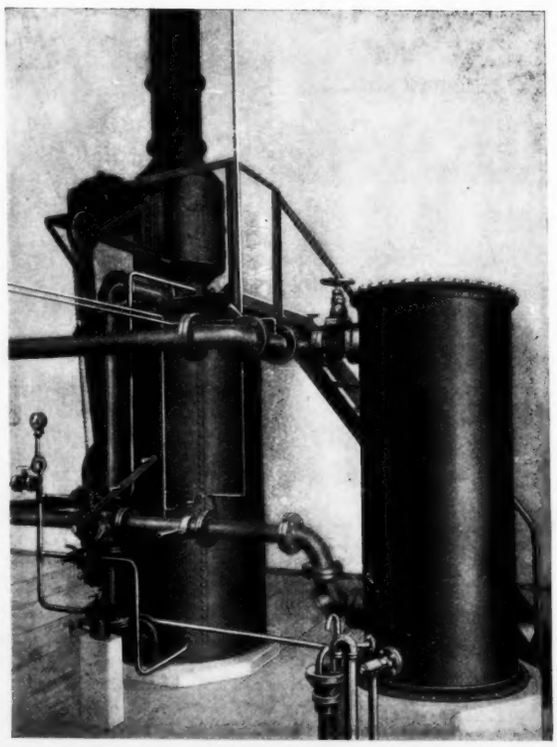
The Recorder can be supplied fitted with Diagram only, or Counter only, or with both forms of registration as shown in illustration.

Full descriptive Catalogues sent on application.

George Kent Ltd
LONDON & LUTON

Sales Office: 199, HIGH HOLBORN, LONDON, W.C.1.

WATER GAS PLANTS



FOR SMALL GAS WORKS.

LOW INITIAL COSTS.

ONE VALVE CONTROL.

HIGHER EFFICIENCIES.

GUARANTEED RESULTS.

For full description see article in "Gas Journal," Sept. 26, p. 934.

BRITISH FURNACES, LTD.,
7, Grosvenor Gardens, London, S.W.1.
Head Office and Works: Derby Road, Chesterfield.

Cleans Cookers Easily

THE Institute of Hygiene has recognised the utility of "OVEN-O" by awarding it the certificate of the Institute.

Cleanliness is of the first importance in the preparation of food, and a clean cooker is thoroughly hygienic. Clean and bright oven walls reflect the heat better than those that are dull and dirty, and cooking utensils which are free from carbon deposit conduct the heat more efficiently. "OVEN-O" is

HARMLESS TO THE HANDS.

Simple, safe and effective. Its regular application will result not only in a saving of gas but in hygienic cookery.

SOLD AT 6½d & 1/-

OVEN-O cleans gas-cookers easily

Sole Makers: HUGH McREA, Ltd., Great Northern House, 345 Gray's Inn Road, W.C.1

Send for full particulars to the Sole Selling Agents for Gas Undertakings in Great Britain and Colonies,

CLARK'S SYPHON STOVE CO., LTD., 161-172 Queen Victoria St., London, E.C. 4, and Grappenhal Works, Warrington.

SPECIAL OFFER OF METERS.

VICKERS LIMITED have pleasure in announcing that they have a strictly limited stock of their well known Accounts Type Patented Meters to clear at the special price of

£2 - 1 - 0 EACH NETT.
DELIVERED FREE. MINIMUM ORDER—SIX METERS.

Each of these meters is covered by the usual five years guarantee, and is perfect in every way. They are rated at 60 ft. and tested to withstand temporary overloads up to 90 ft., 0·166 cubic ft. per revolution. All parts are standardized, and we hold stocks of all spare parts.

ORDER EARLY TO SECURE THIS OPPORTUNITY.

VICKERS LIMITED, ERITH, KENT.
***Head Office:* Vickers House, Broadway, London, S.W.1.**

HUMPHREYS & GLASGOW, LTD.

WATER GAS

	Cu. Ft. Daily
Aarhus	800,000
Abertillery	500,000
Abertillery (2)	100,000
Admiralty:	
British	800,000
British (2)	800,000
British (3)	800,000
British (4)	800,000
British (5)	800,000
French	600,000
French (2)	600,000
Agram	200,000
Airdrie	430,000
Aldershot	1,400,000
Aldershot (2)	1,000,000
Alkmaar	400,000
Allenstein	200,000
Alost	700,000
Amersfoort	300,000
Amsterdam	1,000,000
Amsterdam (2)	1,000,000
Amsterdam (3)	2,700,000
Antwerp	1,500,000
Antwerp (2)	1,000,000
Antwerp (3)	1,500,000
Ashford	250,000
Asnieres	650,000
Augsburg	425,000
Aylesbury	150,000
Banbury	200,000
Banff	125,000
Barmen	500,000
Barrow	300,000
Barrow (2)	500,000
Barry	500,000
Bath	1,000,000
Bath (2)	1,000,000
Bath (3)	1,300,000
Belfast	1,700,000
Belfast (2)	4,500,000
Belfast (3)	1,250,000
Belfast (4)	1,250,000
Benrath	125,000
Berlin:	
Charlottenburg	2,500,000
Danziger Strasse	1,600,000
Neukoelin	650,000
Neukoelin (2)	700,000
Schmargendorf	760,000
Tegel	3,500,000
Tegel (2)	6,350,000
Tegel (3)	245,000
Bilston	375,000
Bilston (2)	125,000
Birmingham:	
Adderley Street	675,000
Nechells	3,000,000
Nechells (2)	3,000,000
Nechells (3)	3,000,000
Swan Village	1,500,000
Windsor Street	3,000,000
Windsor Street (2)	3,000,000
Bishop's Stortford	200,000
Bishop's Stortf'd (2)	300,000
Blois	125,000
Blois (2)	125,000
Bochum	530,000
Bognor	100,000
Bo'ness	125,000
Bordentown, N.J.	125,000
Boulogne	340,000
Bournemouth	1,000,000
Bournemouth (2)	500,000
Bournemouth (3)	1,500,000
Bournemouth (4)	1,000,000
Bournemouth (5)	500,000
Bournemouth (6)	1,530,000
Bremen	550,000
Bremen (2)	950,000
Bremen (3)	850,000
Brentford	1,200,000
Brentford (2)	850,000
Brentford (3)	350,000
Brentford (4)	750,000
Brentwood	250,000
Brest	550,000
Bridgwater	200,000
Bridlington	150,000
Bridlington (2)	200,000
Brieg	100,000
Brierley Hill	250,000
Brighton	1,750,000
Brighton (2)	1,850,000
Brighton (3)	750,000
Brighton (4)	2,750,000
Bristol	2,000,000
Bristol (2)	2,500,000
Bromley	1,500,000
Bruges	200,000
Bruges (2)	600,000
Brussels:	
Anderlecht	350,000
Anderlecht (2)	350,000
Forest	1,000,000
Forest (2)	1,000,000
Forest (3)	1,000,000
Forest (4)	1,500,000
Koekelberg	1,000,000
St. Gilles	1,000,000
St. Josse	1,000,000
St. Josse (2)	600,000
St. Josse (3)	775,000
Ville	750,000
Ville (2)	750,000
Ville (3)	1,500,000
Ville (4)	350,000
Bucarest	1,100,000
Budapest	50,000
Budapest (2)	1,750,000
Budapest (3)	200,000
Budapest (4)	250,000
Caen	250,000
Cambridge	500,000
Cambridge (2)	1,000,000
Cardiff	2,000,000
Cardiff (2)	3,000,000
Cardiff (3)	1,950,000
Cardiff (4)	600,000
Carlisle	600,000
Carlsruhe	500,000
Chateauroux	125,000
Chateauroux (2)	125,000
Châtelet	500,000
Chesterfield	430,000
Chesterfield (2)	90,000
Chichester	250,000
Chorley	300,000
Cie. des Compteurs —	
Montrouge	1,150,000
Coatbridge	400,000
Commercial, London	850,000
Commercial (2)	850,000
Commercial (3)	1,250,000
Commercial (4)	2,000,000
Commercial (5)	800,000
Copenhagen	700,000
Copenhagen (2)	2,500,000
Copenhagen (3)	1,750,000
Courtrai	250,000
Coventry	600,000
Coventry (2)	600,000
Coventry (3)	800,000
Coventry (4)	1,250,000
Cowdenbeath	420,000
Cracow	200,000
Cracow (2)	200,000
Crefeld	500,000
Crewe	700,000
Crosfield and Sons	1,500,000
" " (2)	1,500,000
Crowborough	150,000
Croydon	1,250,000
Croydon (2)	625,000
Croydon (3)	625,000
Croydon (4)	550,000
Croydon (5)	650,000
Croydon (6)	1,125,000
Deal	250,000
Debreczin	100,000
Derby	1,500,000
Derby (2)	2,000,000
Deventer	150,000
Deventer (2)	200,000
Devonport	1,600,000
Doncaster	1,350,000
Dorking	150,000
Dover	530,000
Dublin	2,000,000
Dublin (2)	2,000,000
Dublin (3)	650,000
Dudley	600,000
Dundee	1,500,000
Dunedin, N.Z.	150,000
Dunedin (2)	275,000
Durham	200,000
Dusseldorf	1,000,000
Eastbourne	1,250,000
Edinburgh	2,000,000
Epsom	225,000
Epsom (2)	300,000
Essen	1,400,000
Essen-Borbeck	1,400,000
Falmouth	150,000
Faversham	200,000
Flensburg	300,000
Flensburg (2)	125,000
Forst	300,000
Frankenthal	175,000
Fuel Research Wks.	500,000
Furnes	500,000
Gablonz	140,000
Gas L. & Coke Co.:	
Beckton	10,000,000
Beckton (1910)	7,000,000
Beckton (1911)	3,500,000
Beckton (1912)	7,000,000
Beckton (1919)	7,000,000
Beckton (1920)	5,250,000
Bow Common	1,000,000
Bow Common (2)	1,150,000
Bromley	3,750,000
Bromley (2)	2,250,000
Fulham	2,500,000
Fulham (2)	1,700,000
Kensal Green	2,250,000
Kensal Green (2)	2,250,000
Kensal Green (3)	2,250,000
Nine Elms	2,750,000
Shoreditch	900,000
Shoreditch (2)	2,700,000
Stratford	1,700,000
Stratford (2)	850,000
Gelsenkirchen	175,000
Gelsenkirchen (2)	350,000
Geneva	500,000
Geneva (2)	700,000
Glasgow	3,000,000
Glasgow (2)	2,500,000
Glasgow (3)	2,250,000
Gloucester	800,000
Gosport	200,000
Goteborg	300,000
Goteborg (2)	600,000
Graudenz	200,000
Grays	250,000
Grays (2)	400,000
Guildford	350,000
Guildford (2)	200,000
Guildford (3)	350,000
Haarlem	850,000
Hamburg	1,750,000
Hampton Court	500,000
Hampton Court (2)	600,000
Hanley	800,000
Hartlepool	750,000
Hartlepool (2)	765,000
Hebden Bridge	200,000
Heidelberg	200,000
Hereford	525,000
Hilversum	850,000
Hinckley	250,000
Holyoke, Mass.	600,000
Hong Kong	450,000
Hornsey	2,750,000
Hull	1,500,000
Hull (2)	1,000,000
Ilford	650,000
Ilford (2)	750,000
Innsbruck	200,000
Ipswich	750,000
Ipswich (2)	1,250,000
Kampen	350,000
Karlsbad	350,000
Kiel	1,000,000
Kiel (2)	880,000
Kilmarnock	500,000
Kirkintilloch	360,000
Kolozvar	100,000
Lancaster	500,000
Lausanne	250,000
Lausanne (2)	385,000
Lawrence, Mass.	400,000
Le Mans	420,000
Lea Bridge	350,000
Lea Bridge (2)	350,000
Lea Bridge (3)	400,000
Lea Bridge (4)	1,000,000
Lea Bridge (5)	1,500,000
Lea Bridge (6)	1,530,000
Leamington	600,000
Leamington (2)	525,000
Leeds	1,500,000
Leeuwarden	400,000
Leiden	500,000
Leiden (2)	575,000
Leigh	350,000
Lemberg	260,000
Lemberg (2)	500,000
Liége	1,000,000
Liége (2)	750,000
Lille	860,000
Lincoln	500,000
Liverpool	3,500,000
Liverpool (2)	4,500,000
Liverpool (3)	750,000
Liverpool (4)	1,750,000
Liverpool (5)	1,250,000
Liverpool (6)	3,000,000
Liverpool (7)	1,500,000
Liverpool (8)	1,250,000
Long Eaton	430,000
Longton	600,000
Louvain	800,000
Lubeck	400,000
Luton	400,000
Maastricht	200,000
Macclesfield	800,000
Magdeburg	1,400,000
Maidenhead	225,000
Maidenhead (2)	225,000
Maidenhead (3)	175,000
Maidenhead (4)	175,000
Maidstone	500,000
Maidstone (2)	500,000
Malines	500,000
Malines (2)	575,000
Malmö	350,000
Malta	400,000
Manchester	3,500,000
Manchester (2)	3,500,000
Manchester (3)	1,500,000
Mansfield	330,000
Marlborough	100,000
Mayence	700,000
McKeesport, Pa.	500,000
Merthyr Tydfil	300,000
Merthyr Tydfil (2)	200,000
Middlesbrough	1,250,000
Middlesbrough (2)	750,000
M/M. Woolston	9,000,000
Monaco	275,000
Mons	500,000
Moscow	1,000,000
Munich	1,400,000
Namur	175,000
Narbonne	350,000
Nelson	400,000
Neuss	140,000
Newburgh, N.Y.	600,000
Newbury	250,000
Newcastle, N.S.W.	500,000
New York	5,200,000
Nictheroy	250,000
N. Middlesex	150,000
N. Middlesex (2)	200,000
N. Middlesex (3)	75,000
N. Middlesex (4)	650,000
N. Middlesex (5)	650,000
N. Middlesex (6)	1,000,000
North Sydney	500,000
North Sydney (2)	500,000
Norwich	1,000,000
Norwich (2)	300,000
Norwich (3)	500,000
Norwich (4)	1,500,000
Nottingham	1,000,000
Nottingham (2)	1,000,000
Nuneaton	125,000
Oberhausen	175,000
Oldbury	500,000
Oldenburg	200,000
Ormskirk	170,000
Ostend	100,000
Ostend (2)	200,000
" Zandvoorde	700,000
Paris:	
Landy	5,400,000
Villette	3,600,000
Clichy	3,600,000
Pau	550,000
Pembroke	240,000
Perigueux	350,000
Perth, W.A.	125,000
Piggott and Co.	1,500,000
Poitiers	350,000
Pontypool	120,000
Port Elizabeth	400,000
Portsmouth	1,000,000
Portsmouth (2)	2,000,000
Portsmouth (3)	800,000
Posen	450,000
Posen (2)	700,000
Prague	140,000
Preston	1,400,000
Ramsgate	430,000
Reading	1,000,000
Reading (2)	1,000,000
Redditch	500,000
Redhill	275,000
Redhill (2)	300,000
Reichenberg	200,000
Reichenberg (2)	200,000
Reval	350,000
Rhymney	175,000
Rhymney (2)	250,000
Ripley	120,000
Rochester	2,200,000
Romford	300,000
Romford (2)	350,000
Rotterdam	850,000
Rotterdam (2)	1,500,000
Rotterdam (3)	750,000
Rotterdam (4)	750,000
Rotterdam (5)	600,000
Rotterdam (6)	2,000,000
Royston (Yorks.)	250,000
Rugby	1,000,000
Rushden	425,000
St. Albans	700,000
St. Andrews	210,000
St. Gallen	225,000
St. Gallen (2)	225,000
St. Joseph	750,000
Sté. Chim. de la Gr. Paroisse	1,320,000
San Paulo	700,000
Santiago, Cuba	400,000
Scarborough	800,000
Scarborough (2)	200,000
Scarborough (3)	350,000
Scarborough (4)	1,300,000
Seaford	200,000
Shanghai	225,000
Shanghai (2)	225,000
Shanghai (3)	1,600,000
Sheerness	200,000
Sheerness (2)	180,000
Sheffield	1,530,000
" Steel Prods.	5,000,000
Shrewsbury	300,000
Southall	2,000,000
Southall (2)	2,000,000
Southampton	800,000
Southampton (2)	500,000
Southampton (3)	600,000
Southampton (4)	100,000
Southampton (5)	1,000,000
Southend	1,250,000
Southend (2)	900,000
Southend (3)	900,000
Southgate	400,000
Southgate (2)	500,000
Southgate (3)	800,000
Southport	750,000
Southport (2)	900,000
Southport (3)	700,000
South Shields	650,000
South Shields (2)	1,250,000
Stafford	500,000
Staines	600,000
Stettin	880,000
Stirling	400,000
Stockholm	1,500,000
Stockholm (2)	1,750,000
Stockport	600,000
Stockport (2)	600,000
Stockport (3)	400,000
Stockport (4)	400,000
Stockton	500,000
Stockton (2)	250,000
Stourbridge	500,000
Stourbridge (2)	500,000
Sunderland	2,250,000
Swansea	750,000
Swansea (2)	1,000,000
Swansea (3)	450,000
Swansea (4)	1,250,000
Swindon	300,000
Swindon (2)	450,000
Sydney	1,000,000
Sydney (2)	1,000,000
Sydney (3)	1,000,000
Sydney (4)	1,000,000
Syracuse, N.Y.	850,000
Taunton	225,000
Taunton (2)	350,000
The Hague	1,000,000
The Hague (2)	500,000
The Hague (3)	1,750,000
Tilburg	400,000
Tirlemont	120,000
Tokyo	2,000,000
Torquay	350,000
Torquay (2)	350,000
Torquay (3)	320,000
Tottenham	750,000
Tottenham (2)	750,000
Tottenham (3)	350,000
Tottenham (4)	1,000,000
Tottenham (5)	1,000,000
Tottenham (6)	1,250,000
Tottenham (7)	2,500,000
Tottenham (8)	1,000,000
Tournai	700,000
Tours	550,000
Trowbridge	250,000
Tunbridge Wells	1,000,000
" " (2)	1,000,000
Tunis	175,000
Tynemouth	1,100,000
Ulm	400,000
Utrecht	1,000,000
Utrecht (2)	1,000,000
Verviers	1,000,000
Vienna	3,500,000
Vienna (2)	2,500,000
Walsall	750,000
Waltham	400,000
Waltham (2)	140,000
Wandsbek	125,000
Wandsworth	1,800,000
Warwick	125,000
Wasmuel	500,000
Watford	300,000
Watford (2)	350,000
Watford (3)	400,000
Wath	430,000
Weimar	100,000
Wellingborough	525,000
Wellingborough (2)	525,000
Wellington, N.Z.	350,000
West Bromwich	550,000
Westgate	250,000
Weston-Mare	350,000
Weston-Mare (2)	350,000
Weston-Mare (3)	150,000
Weston-Mare (4)	150,000
Wexford	100,000
Weymouth	400,000
Weymouth (2)	100,000
Widnes	500,000
Wiesbaden	850,000
Winchester	225,000
Winchester (2)	125,000
Winchester (3)	410,000
Woking	400,000
Wolverhampton	1,500,000
Wolverhampton (2)	1,000,000
Wolverhampton (3)	250,000
Worthing	525,000
Yarmouth	500,000
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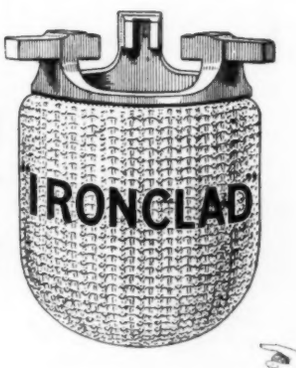

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EDITORIAL NOTES.

Maintenance and Extension of the Domestic Business.

In the gas industry a new order of conditions is being built up. Change is coming over all its operations, and gradually has been doing so for some time past. But the pace is now being accelerated, partly owing to the Gas Regulation Act, and partly to those external influences which energize in the cause of self-defence. The question of the development of still greater economy and efficiency in gas production, having regard to all the factors bearing upon net cost, is well in hand; and the related problems are being examined day by day. We can for the time being afford to leave these matters in the hands of those who are working at them, and concentrate rather more upon the business part of the industry's affairs. Close observation induces us to be very earnest respecting this matter. The most critical and vital part of our work to-day is where either expansion or shrinkage of the interests of the industry sets in, and that is where gas consumption takes place. It is there that a broader policy must be developed generally in the industry. A high standard in this respect has already been reached in some quarters; in others, the traditional neglect still obtains, although the developments of gas-using appliances, the increasing richness of the business done, and the wealth of heating business still waiting to be secured, claim new ideals and increasing vigilance and activity. In these times, there cannot be too much insistence upon the needs and the claims in this particular territory of the industry's work. General progress of the industry, and protection of its interests, can best be effected by a unified high standard of policy and method in this regard; and therefore the apostles of a higher efficiency in the homes of gas consumers should preach the gospel from every available platform provided by the organizations of the industry. We have had it at a meeting of the Institution of Gas Engineers, when Dr. Carpenter expressed his views on the lighting load. The subject has been before the North British Association, and has been discussed; and last Friday, the members of the Manchester Institution were invited to express their opinions on the question through a paper brought before them by Mr. W. B. M'Lusky, Engineer and Manager of the Halifax Corporation Gas-Works. He is one of the older apostles in this matter. For a quarter of a century he has been advocating that the gas man should be more in evidence, looking after things, on the outlet side of the consumer's meter. We recall particularly his paper on "Gas for the House" before the North British Association in 1905—eighteen years ago—and his contribution on "Facilities for the Use of Town Gas" at the district conference at Oldham on March 22 last. He speaks not as a theorist or idealist, but from practical experience, though there is no question that sound ideals as to what was necessary originated the policy and the work that led to the practical experience.

There is rather a singular feature about some gas undertakings respecting policy and experience. The domestic business of gas supply is the basic interest of the gas industry; but we have observed in connection with many undertakings in industrial or trading centres that modern developments in the use of gas for heating in industry or in trading operations receive from them a considerable amount of attention. The innovation attracts and interests the officers; and they will, and very properly, do all in their power to ensure that industrial and trade appliances are used and maintained at a high state of efficiency. The result is few complaints and a growing satisfaction—so far as heating operations are concerned. Precisely what is done in industry and trade is what is required in the domestic business; and there is no doubt that the same results will follow. We want to study the effects of the use of gas in the household; and where the effects are not up to approved standard, the causes require investigation. Why is it there are dissatisfaction and complaints from some consumers, and not from others? Why is it that some use more gas than others in approximately identical circumstances? Why is it that there are complaints by some consumers of high gas bills, and not by others? That there are dissatisfaction and complaints is a detriment to the interests of the gas business. Dissatisfaction is as potent a factor against a commodity as is satisfaction in its favour. For an undertaking the latter is more desirable than the former.

To the questions put above, some will laconically answer, "Waste." To which the further question may be put, "Why is there waste?" The only possible reply is the consumer's indifference or want of knowledge. But however well-informed and apt a consumer may be, he cannot take the place of a skilled gas man. To reduce indifference and ignorance is the work that has to be tackled, because high gas bills and a "serve-them-right" attitude will not do, with competition pressing. Gas undertakings have to protect themselves; and protection is found in service to their customers. That is the rational aspect of the matter; and the required policy can be condensed into systematic inspection, regulation, and maintenance. The result of this work is educative. It educates the consumers in a twofold way. It shows them what can be done with gas and with the appliances they use; it accustoms them to a higher standard of efficiency, and makes them more and more dissatisfied with the low efficiency of the past. In gaining this enlightenment, in inculcating a new standard in performance, it is worth while any gas undertaking making a special effort and spending more money for a year or two than would ordinarily be required for systematic maintenance. Mr. M'Lusky holds that there can be no satisfactory progress in the business of gas supply without maintenance. This is putting the position somewhat bluntly; but there is a vast amount of truth in it. We want to see losses of business reduced, and the rates of increases elevated to higher stages. As to the methods of maintenance that should be adopted, engineers will have different views; but that does not matter much if the same goal be won. But any maintenance scheme must be thorough; and to be thorough, the routine must be properly organized. The thoroughness will bring its reward; and its proper organization, with the services of trained men, will result in the work being done in the most economical manner. The methods applied at Halifax are briefly described in the paper.

As just indicated, a systematic and well-organized scheme of maintenance will be the most economical for both gas undertaking and consumers. It is the assumption of the high cost of the proposal that has diverted some responsible engineers from recommending adoption. The assumption is born not from experience, but from a superficial examination of the question. The aggregate cost of losses of business, dissatisfaction, special visits to remedy complaints, and the non-rectification of existing defects, we

imagine, is in some cases higher than would be the institution of a well-devised scheme of periodical maintenance. Against those losses we cannot set the profit arising from the net increase of business, and say "We are doing well." We are "doing well" when applied service methods reduce losses to the minimum, and raise increases to the maximum. This we think will be admitted to be good logic. Preservation of business has a money value; the extension of business which comes from the satisfaction of existing consumers has a money value; the satisfaction of existing consumers is an excellent advertisement; any increase of business reduces overhead and distribution charges per unit of gas sold. Actual experience—not assumption—shows that the cost of maintenance of consumers' appliances (with a charge only for material) need not be high. We have had evidence of this from Glasgow. In the paper before us, Mr. M'Lusky states that in Halifax last year the cost of distribution amounted approximately to £27,000. The items included in the sum are mentioned. All told, they represent a fraction under 8d. per 1000 c.ft. of gas sold. One of the items—fittings inspection—embraces all routine and special visits made to consumers' premises for the adjustment or repair of their lighting burners and non-lighting appliances (time only). The lighting burners cost per visit 5·7d.; the non-lighting appliances, 1s. 5·37d. We should like this item worked out to per 1000 c.ft. and per therm sold, as that would tell how much it affects the cost of gas, without taking into consideration the money value of the contras to which reference has been made. That value must in the case of Halifax be considerable; for Mr. M'Lusky informs us that the total number of complaints now received only averages 3·86 per day in respect of non-lighting appliances, which equals one for every 8000 consumers served, and complaints regarding lighting points amount to less than six per month from the whole area of supply. There is sufficient here to show that the policy of maintenance is right. We would go farther, and say that in any circumstances maintenance is politic—and in the changed circumstances, imperative. It is a phase of policy that should not to-day be treated in any meticulous fashion.

The paper contained many other features—the question of concessions in price, which can be met by a sliding-scale of discounts; the fitting up of all-gas houses; and the importance of directing the attention of those who design and build houses to the importance of ventilation. But there was another topic which, more than the others, is allied to the one that we have been discussing. It is that of internal piping. There must be almost common agreement with Mr. M'Lusky that every gas undertaking should make it its business to get architects, builders, and others to work to piping specifications in all new houses, and to urge them, whenever opportunity allows, to increase the capacity of the piping to the probable maximum demand of a house. Owners of property cannot genuinely expect that they should not be called upon to supply adequate gas-piping where it is inadequate for modern requirements. There is much piping in existence which was put in for lighting only in the days of flat-flame burners. That piping has in some cases answered latter-day requirements, owing to the smaller consumption of incandescent burners, and the diversity of the incidence of consumption for lighting and cooking. But now there is labour-saving heating—room and water; and heating is the biggest potential field for the industry. The pipes in many houses are already insufficient in capacity; in other instances, they cannot stand more load. As we progress, these conditions will be accentuated. Mr. M'Lusky says that owners of house property are not keenly interested in the renewal of the piping, inasmuch as it does not tend to increase their revenue. But the sufficiency of gas-pipes is one protection to the letting value and attractiveness of houses. The unfortunate thing is that, at present, houses (be the gas-pipes adequate or inadequate) are so badly wanted that the supply is not equal to the demand, though we are approaching a better balance than existed two or three years ago. The house owner is "top dog" to-day; and in some respects there is cause for sympathy with him. But the day is coming when there will be a change; and the property with conveniences suitable to modern ideas and spending capacity, will then be most in favour.

Too much attention cannot be devoted to the subjects with which Mr. M'Lusky deals in his paper; and we hope to see, during the next few months, the main question of a larger policy on the consumer's side of the meter brought before all the District Associations.

Alloa and the Gas Rates Leviable.

Up to the time of going to press, no answer has been received from our Alloa correspondents—Mr. Duncanson and Mr. Cuthbert—to the questions which were submitted to them in our editorial article last week. Above all, we are keenly interested in obtaining from them information as to the legal position in the matter of saddling the gas consumers with the electricity deficits which the Council have been storing-up. The 1890 Act only authorizes Scottish municipal bodies to liquidate electricity deficits from "the gas rates leviable, and gas rents and other revenues receivable, under the General or Local Act." We should like to have from the Town Clerk reference to any Act—General or Local—which has given them power to levy gas rates for any purposes in excess of those defined by section 41 of the Burgh Gas Supply Act, 1876. That Act only authorizes the Council to raise sufficient income to discharge all the costs and expenses of, and incident to, the manufacture and distribution of gas [not electricity], together with the interest on all money borrowed in respect of the gas-works, and to provide a sinking fund, and a depreciation and renewal fund for their maintenance. "The moneys received in respect of, and incident to, the manufacture and distribution of gas shall be applied *to such purposes only*." Nothing is said in the section as to electricity; and we are not aware of any General or Local Act that has varied it, so far as Alloa is concerned, to permit of electricity deficits being liquidated from the "gas rates leviable." There may have been. Therefore, in this connection, all we ask for is enlightenment from the Town Clerk, first, as to whether the authorization in the schedule of the Electricity Act of 1890 is useless, unless provision has been made in a General or Local Act to amend section 41 of the 1876 Act, so as to include electricity deficits in "the gas rates leviable." If there is not such authorization, then may we put the further question: Will the Alloa Council be acting *ultra vires* of the 1876 Act by defying the injunction that the moneys received by the gas undertaking shall be applied only to the purposes specified by the Act? We are not presuming to express any opinion from the legal standpoint. But this is a matter upon which doubt has previously existed; and with such a big accumulated deficit, and the prospects of an addition of 7d. per 1000 c.ft. to the price of gas for six or seven years, Alloa affords a fine opportunity to have the question set at rest. It would be a good thing if some of the more prominent gas consumers sought the opinion of the Courts upon the point.

Further Eatonian Exploits.

A correspondent calls our attention to further evidence of the impudence of a certain group of company promoters. A prospectus dated Oct. 1 offered 8 p.ct. preference shares at par, and 7 p.ct. first mortgage debentures at £95 p.ct., in the Wareham Electric Supply Company, Ltd. One of the Directors is Allan M. Eaton. On Oct. 10 our correspondent (who is a shareholder in various south-western gas undertakings) received a letter from the Lighting and Power Finance Corporation, Ltd., stating: "We are buyers of "shares in gas companies, and shall be glad to hear whether "you are offering your shares for sale in the Wareham Gas "Company, Ltd." One of the Directors of this benevolent Lighting and Power Finance Corporation, Ltd., is "A. M. Eaton"—the same person who figures as a director of the Wareham Electric Supply Company. Here obviously a double game is being played. A considerable amount of capital is being sought for an Electricity Company by the offer of high rates of dividend and interest, and suggestions that promise much for the future; while, on the other hand, another concern, with which the name of Eaton is associated, is seeking to acquire the investments of any nervous shareholders in the Gas Company in the district. Our advice to them is not to be frightened into parting with any of their shares. Gas shares that are of value to the Lighting and Power Finance Corporation, are of greater value to present holders. We have a bundle of old prospectuses of gas companies which eventually passed through the receiver's hands, and which were the progeny of the notorious promoter Edmund O. Eaton; and the Lighting and Power Finance Corporation, appears to be one of his precious offsprings.

In "Truth" for Aug. 29, there was an article warning investors against the flotation of the Cambrian Electricity Supply Company. Remarking that the parentage would

damn it in the eyes of any prudent investor, the writer proceeds to say that the "promoters are the Lighting and Power Finance Corporation, which is one of several joint-stock aliases of the notorious Edmund O. Eaton, sometimes known as Colonel Eaton. As usual, his own name is discreetly kept in the background; but one of the Directors of Cambrian Electricity is Allan McLean Eaton, who as a dummy director or in other capacities—occasionally as auditor!—has often been associated with Edmund's bubbles." Mention is made of the fact that for over twenty years Eaton has been a prolific promoter of all sorts of "rotten little companies." There were the trumpery rural gas and water undertakings, which invariably came to an ignominious end. Since the war, it is stated, he has turned his attention to miscellaneous industrial concerns—such as a paper-mill and a tool-making concern, now both in compulsory liquidation—and also to small electricity works. What is described as an "especially audacious ramp" of the latter class is the Chagford and Devon Electric Lighting Company. Only a few months ago the Wareham Electricity Supply Company, which was in process of winding-up, came under Eaton's control; and in June last 350 shares of £10 each and 500 debentures also of £10 each were offered for sale. Allan M. Eaton became the Chairman of the Company. The offer of the shares and debentures was made by the Electricity Finance and Distribution Corporation; and this, "Truth" says, is the very latest of the aliases under which Edmund Eaton carries out such transactions. Enough is said. We hope the shareholders in the Wareham Gas Company will not be so foolish as to part with their shares.

Domestic Fuel.

THE gas industry is accustomed to being reviled. Its gas-meters are supposed by some people to be untruthful; the therm was a conception of some evil-minded person for the purpose of insidiously cheating the public; and its bye-product coke is an abomination in the eyes of the people. Yet the number of gas-meters fixed increases luxuriantly year by year; gas accounts are coming down with the cheapening of the therm; and more coke than ever is being used in industry and trade (more still will be required when normal conditions again prevail), and countries abroad are buying more and more of it. It is coke which interests us at the moment. A communication with coke as the subject recently appeared in the "Financial Times." We are not very much concerned with what was said, excepting that the writer, quoting from reports from America, pointed to coke as being for open household fires a very efficient fuel in respect of radiant efficiency. Of course, the use of coke produced at high temperature would prevent black smoke; but there would not be sufficient to go round even if universally acceptable as a fuel. This obvious point is made by Mr. David Brownlie in a letter to our financial contemporary; but this well-known industrial fuel expert fails completely to present the attitude of the gas industry towards this problem.

Let us follow Mr. Brownlie's argument. Great Britain, he says, consumes 187,500,000 tons of coal per annum (the Chief Inspector of Mines gives the figure for 1922 as 162,270,000 tons), included in which is 35 million tons for household purposes. In normal times, the amount of coal carbonized by gas-works is 18,000,000 tons per annum, and by coke-ovens 20,000,000 tons. The total yield of soft gas coke is not much more than (say) 10,000,000 tons per annum. As a matter of fact, during last year, after deducting coke used on gas-works and exported, there were only 7,737,718 tons for sale in Great Britain. Therefore, Mr. Brownlie argues, if the whole production of gas-coke was suddenly diverted to the single purpose of providing household fuel, it would not be sufficient to fill the requirements of more than about one-third of the domestic fires of the country—that is, it could only prevent less than 20 p.ct. of the total smoke. In practice, he holds, the net result would probably be a reduction of less than 5 p.ct. of the smoke. It is a little vague as to how these percentages are arrived at; but it matters little to the gas industry, as it has its eyes set not on coke for providing a solution of the smoke problem. Coke could at most be only a contributor to the solution. But Mr. Brownlie goes on to presume that the correspondent who incited his letter was not suggesting that, for the sake of preventing black smoke, we should proceed to carbonize another 40,000,000 tons of coal per annum in gas-works plant—incurring the necessary capital expenditure of literally hundreds of millions of pounds on gas plant, which would be largely pipes, so as to produce sufficient coke for domestic fires in addition to the production of millions of gallons of high-temperature benzenoid tars for which there would be little or no use, to say nothing of the excess gas.

That is the point where we separate from Mr. Brownlie. There would be no "excess gas." The gas industry has no intention of making coke its primary product. Its anticipation is that some day the main fuel supply of this country will be not solid, but gaseous. The coke (as such) that is not required by the markets will be gasified; complete gasification, too, will be largely practised. A labour-saving fuel is the coming thing. It is easy to produce; its distribution can be carried on at higher pressures, thus increasing the carrying capacity of mains. It may be that the time will come, too, when (with the higher pressures for transmission) every gas-service pipe will be fitted with a governor. We are all looking forward, and speculating as to what may happen. Gas is used at a higher efficiency than any solid fuel—coal or high or low temperature coke—for domestic purposes; and, this being so, with the facility of lighting and extinguishing as required, and not burning fuel unnecessarily to "keep the fire in," it may be that, by the gaseous method, less than the 40 million tons of coal would be required to supply the heat at present found necessary for domestic purposes. That deals with the question of "excess gas." But Mr. Brownlie has his eyes not on labour-saving fuel, but on low-temperature carbonization and coke. He talks of the "hundreds of million pounds" that would be required by the gas industry to deal with three times the quantity of coal it at present carbonizes. To multiply the operations of the industry by three does not to us present any insuperable difficulties—given time for development. But he does not enlighten us as to how much capital would be required to treat 40 million tons of coal by the low-temperature system for a fuel consumption varying with the seasons. Has Mr. Brownlie, too, considered whether the yield of low-temperature coke would suffice to compensate for the 40 million tons of coal? The expenses of transport, storage, and labour involved by low-temperature coke are also neglected, in comparison with the transmission of gas to the point of combustion, as well as of the labour entailed in the household by the respective fuels. His case for the provision of a domestic fuel by low-temperature treatment is not very convincing, being confined to the single comparison of high-temperature and low-temperature coke; and even in this respect there are omissions in the argument.

The Electrical Controllers.

THERE has been at Fulham a notable illustration of the power which the conditions of electricity supply place in the hands of electrical workers. Their intervention in a dispute between the Borough Council and some 500 municipal employees who were on strike demonstrated to the Council that this section of their employees can, by lightning action, produce such immediate and disorganizing effects, that they can and must be regarded as a potent factor in helping, by admittedly unconstitutional means, other workers who cannot by ordinary methods gain their ends or a compromise acceptable to them. That power is one which, in respect of public utilities, ought to be placed by Parliament under more effective control.

In the Fulham case, the trouble began with the dustmen not being willing to have, under a decision of the Council, a revision of their terms of employment. The disturbance spread to other municipal workers, until, as mentioned above, something like 500 were involved. The reports state that no less than ten trade unions were concerned in the dispute; and all their efforts to arrive at a settlement proved abortive—up to last Wednesday evening. Then the electrical employees determined to assist their less affluent fellow municipal workers to bring matters to a head by also ceasing work, which they did at noon on Thursday. Suddenly factories and cinemas relying upon municipally supplied electricity for power and lighting found themselves unable to pursue their normal operations; and later shops and houses had to have recourse to candles and oil-lamps. The action of the electrical men was effective; and considerable consternation prevailed in the Borough Council circles and among the factory owners. There was a hastily convened

conference; and after the supply of electrical energy had been cut-off some six hours, an agreement in the nature of a compromise was effected. The electrical workers then resumed their duties; but it was not until late in the evening that the supply once more attained adequacy.

This is an illustration of one feature of the power of electrical workers. There is another. It bears on the question of the linking-up of, and mutual help in times of emergency by, electricity undertakings. Electrical workers are "linked-up" as well as undertakings. The policy of interconnection between supplies is of no use whatever when a strike occurs of the workers of one station. In this instance, the employees of the Battersea and Hammersmith stations, immediately the Fulham stoppage was announced, entered into a compact to come out if any attempt was made to supply current to the affected neighbouring borough. Thus the trouble would not be localized, but would be distributed farther afield. The difficulty would be worse still in the case of a super-power station serving several cities and towns. However, the Fulham incident supplies an excellent argument in favour of the private gas-driven generating plant, to add to the one of economy and reliability, where there is preference for both electric lighting and power.

Coal Profits and Export Prices.

There is still an appalling amount of industrial unemployment in this country; and therefore the larger business that has been done in the selling of British coal abroad has been a tremendous relief to the coal-mining industry. Profits have increased; but there have been long periods in which they have been lean. However, the position generally appears to have induced the coal owners to take a firmer attitude towards buyers, and their expectations as to the future are of a more expansive order on their own side. They are not showing any disposition to recede from current prices for some distance ahead—for some months, in fact, beyond the pressure of winter demand. However, changes often come swiftly; and the conditions that influence coal buying and selling may alter from the present state more rapidly that is at present contemplated. Regarding the improvement in profits, in the quarter ending June, the production was 65,527,464 tons, of which 60,094,456 tons were available for export and home consumption. The proceeds of sales amounted to £61,400,723, averaging per ton 20s. 5·21d. The net costs amounted to £51,724,937, averaging per ton 17s. 2·57d. The surplus, therefore, was £9,675,786; being an average of 3s. 2·64d. per ton. The net surplus compares with a deficit in the corresponding period of 1922 of £34,685. In the June quarter, only three of the smaller districts—South Stafford and Shropshire, Cumberland, and Kent—failed to pay their way; the other areas had surpluses ranging from 1d. to just under 5s. per ton. It is hardly likely that the September quarter will come out so well as the June one. There was a decline in the volume of shipments abroad; and the average prices received from the coal exported also made a move downwards. In April the average price per ton for exported coal was £1 6s.; in May, £1 7s. 10d.; in June, £1 7s. 2d. In July, an average of £1 6s. 1d. was received; in August, £1 5s. 2d.; and in September, £1 4s. 9d. The lowest average monthly price this year was in January—£1 2s. 4d. per ton. Between January and September, 1922, the highest average monthly price was £1 3s. 9d., and the lowest £1 2s.; in 1920, £4 9s. 8d. and £3 8s. 8d. respectively; in 1913, 14s. and 13s. 4d. From the above figures, it will be seen that, with an average net cost of 17s. 2·57d. per ton, the coal owners were not doing at all badly in the June quarter with their coal sales abroad, at monthly average prices of £1 6s., £1 7s. 10d., and £1 7s. 2d. per ton.

Exhibition Impressions and Lessons.

At our invitation, Mr. R. J. Rogers, the Hon. Secretary of the National Gas Exhibition, has contributed an article to "The Gas Salesman" (circulated with this issue) on the impressions and lessons that he gathered from the recent great display in the Bingley Hall, Birmingham. He lived for many weeks in and for the exhibition; and his after-reflections will be read with great interest throughout the gas industry.

"N.G.C." Standard Cookers.

It will be seen on a later page that addenda to the specification for the standard gas-cooker have been issued, containing modifications and additional constructional details in regard to burners, taps, open top grids, &c. These are accompanied by information as to facilities for the manufacture of the cookers, in respect of which an agreement is now being prepared by the National Gas Council. There is also in preparation a draft model form of contract between manufacturers and purchasing gas undertakings, in which, of course, can be incorporated any special conditions which the latter may deem necessary.

National Gas Exhibition Essays.

From the Hon. Secretary of the National Gas Exhibition (Mr. R. J. Rogers), we have received the names of the successful competitors in the Essay Competition organized for employees of the gas industry by the National Gas Exhibition Committee. The list is published in our news columns this week.

"Japan's Purgatory" and Drawing Materials.

From more than one quarter, our attention has been called to a paragraph which appears in "The Arc"—a bulletin published by J. Halden & Co., Ltd. The paragraph in question is headed "Japan's Purgatory—and the Future." It refers to the great earthquake; and the fire which succeeded. It is stated that the latter, if not started, was at least greatly assisted in its disastrous work by the presence of gas in the pipes under the streets. Later on, there is this expression of opinion: "If in rebuilding Tokio and Yokohama, they [the Japanese] were to exclude gas for all purposes in favour of electricity, they would not only do much to ensure the safety of their countrymen and buildings, but give a lead in developing better social conditions, which old civilizations would do well to imitate." We dealt in our issue of Sept. 5 last [p. 687] with the contribution gas was supposed to have made to the fire in Tokio. "The Arc" has overlooked the part of electricity in adding to the horrors. Reference was made to them in our issue of Sept. 12 [p. 730]. One eye-witness stated: "Live wires were strewn everywhere; and many people were electrocuted. The screams of the people buried in the wreckage, I will never forget." Another saw the passengers in a tramcar—all dead. "When a Japanese was asked how it happened, he pointed to the trolley wire." The writer of the paragraph in Messrs. Halden's "Bulletin" who suggests the boycott of gas does not mention these things. The firm are suppliers of drawing-office requisites. In view of the paragraph, one of our correspondents has decided to cease buying from the firm; another correspondent says it would be a good thing if gas engineers and contractors bear in mind the views of "The Arc" regarding gas when placing orders for drawing-office material. Perhaps many of them will do so, after this unfair and deliberate attack on gas. We wonder where this country would have been in the great war if gas-works had not been in existence here. The Japanese are not fools. But the world possesses far too many examples.

The Mysterious Therm.

The "Daily Mail" is looking more benevolently on the therm than it did a year ago, though there are still indications that it has not mastered the simplicity of its constitution and its objects. It still seems to harbour the idea that there is something a bit mysterious about it. But there is a little consolation in the knowledge that our contemporary is of opinion that the therm is putting on better behaviour, because people who complained of high gas bills twelve months ago find that, though still charged by the therm, their bills have appreciably diminished. This is due to three causes—lower charges per therm, more favourable conditions, and the fact that high gas bills have had a salutary effect upon waste. Of course, the "Daily Mail" is not sufficiently long-sighted to see that consumers are more to blame for high gas bills than the therm. Some people spend more on whisky than other people. Of course, we should not expect the "Daily Mail" to understand why they do so.

Tarred Roads and Horse Traffic.

In constructing and maintaining roads, consideration must be given to the maximum class of traffic which they are called upon to carry and to serve. The other day a case was heard in the King's Bench Division, by Mr. Justice Darling and a Special Jury, in which Mr. H. Lushington Storey, of Malmesbury, made

a claim upon the Wilts County Council for the loss of a hunter (valued at £150). The loss, it was alleged, was due to negligence in the repair and maintenance of the road between Malmesbury and Chippenham. Two months before the horse fell and injured himself, the road had been repaired and tarred; and the surface, it was stated, had become like glass. This shows the extent of the motor traffic on the road. For the defence it was shown that the tar-spraying of roads has become general, owing to the wear and tear by motor traffic; and therefore there was no negligence. It was agreed that, on the whole, tarred roads were more dangerous for horses than the old-fashioned roads of forty years ago—the foothold not being so good. But roads have to be dealt with in the way which will best suit modern requirements. The result was a verdict for the County Council, with costs.

Distribution of Coal.

There is an interesting section in the report of the Chief Inspector of Mines, which gives information as to the distribution in 1922 of the coal available for home consumption. Deducting exports and bunker coal for foreign shipments, the approximate total consumption of coal in Great Britain during the year was 162,270,000 tons. In the analysis, allowance is not made for the difference in the stocks of coal held by consumers at the beginning and the end of the year; but a deduction is made for the coal-equivalent of coke and manufactured fuel exported from Great Britain. Taking first coke-ovens, the quantity of coal used was 13,291,000 tons; and, deducting the equivalent coke exported (2,357,000 tons), the net quantity was 10,934,000 tons. The corresponding figures for 1921 were: 6,883,000 tons used; coke exported, 443,000 tons; net home consumption, 6,440,000 tons. Gas-works are credited with having consumed last year 16,556,000 tons of coal. They exported 1,381,000 tons of coke; leaving the net home consumption at 15,175,000 tons. The corresponding figures for the previous year were: Quantity of gas coal used, 16,652,000 tons; coke exported, 672,000 tons; net home consumption of coal, 15,980,000 tons. This shows the big expansion in the foreign trade in gas coke. Passing over manufactured fuel, it is seen that electricity generating stations belonging to authorized undertakings and to railway and tramway authorities used in 1922 6,805,000 tons of coal, and in 1921 6,450,000 tons. These figures do not include coke. We will only quote one other item from the remainder. The quantities of coal used for domestic purposes and general manufacture are braced together, and are given as 92,063,000 tons in 1922, and 69,007,000 tons in 1921. It is estimated that in 1922 about 35,000,000 tons of coal were available for domestic use; leaving about 57,000,000 tons available for general manufacture. The figures indicate a material improvement in the trade of the country.

PERSONAL.

So many friends in the industry have inquired about Mrs. EDWARDS, that we have pleasure in saying she is making excellent progress after the grave operation she underwent two weeks ago in a Mayfair nursing home.

In the gas and tar industries, we are sure, the many friends of Mr. J. E. BARLOW, Director of Messrs. Hardman and Holden, Ltd., chemical manufacturers, Miles Platting, Manchester, will be interested to know that he completes fifty years' service with the firm on Nov. 2, having joined as office boy on Nov. 3, 1873. After showing great zeal and assiduity in the various positions of the office, Mr. Barlow was appointed to the post of Cashier, and subsequently, on Feb. 15, 1898, became Secretary to the Company. After holding this position until March 17, 1916, he was elected a Director, and now occupies the position of Sales Director.

Mr. A. MACKAY, Chief Gas Engineer to the Stoke-on-Trent Corporation, has been authorized by the Corporation to accept an invitation from the National Gas Council to act in connection with the Royal Commission on Mining Subsidence.

At the Annual Festival of St. John of the Manor Lodge of Freemasons at Blackburn, Brother G. P. MITCHELL, Gas Engineer, was installed as Steward.

We have received from the Secretary (Mr. W. J. Smith) a copy of the membership list of the National Gas Council of Great Britain and Ireland, as at August last.

ELECTRICITY SUPPLY MEMORANDA.

THE new scheme of the Government for giving financial assistance to projects which will help to relieve unemployment has received a large amount of attention in the electricity supply industry. But the pity of it is that not only in that industry, but in others, the Government plans came so late that we are afraid all the good intentions for the winter on the threshold of which we are standing will not develop to any material extent. Schemes have to be developed, specifications drafted, drawings made, contracts have to be invited, considered, and entered into, the material has to be purchased, and so forth. All the preparatory work takes time; so that the chances of the Government scheme doing a great deal to afford relief this side of Christmas is not at all promising, however great the efforts to expedite matters. We read in the "Electrical Review" that several municipal electricity authorities are giving practical attention to the subject. But to be fully effective in the winter months the "practical attention" should have been accorded months ago; and the schemes should by this time have been so far advanced that employment would already have been affected by them. But unfortunately that is not the case—owing to Government delay.

Unemployment Grants.

Municipal and Company Assistance.

Our contemporary makes some comments on the differences between the terms offered by the Government to local authorities and to public utility companies. We agree that they are, in the result, more generous to the former than to the latter. The "Review" is of opinion that the terms and conditions on which assistance is offered to public utility companies to promote work might perhaps have been considerably better, since, if there were more encouragement, it might affect a good many schemes in different parts of the country, which might be pushed forward with great benefit to everybody concerned. If it is worth while to secure the help of the public utility companies in dealing with this great problem of unemployment, then there seems to be no reason why the terms offered them should not have an equality with those submitted to municipal authorities. Some of the differences were referred to in an editorial article in the "JOURNAL" for Oct. 17 [p. 176].

Electricity Business or the Unemployed?

When one glances through the news items in our electrical contemporaries, it is seen that local authorities with electricity undertakings are rather obsessed with the idea that electricity can be at the business end made to benefit in company with the unemployed. For instance, a scheme has been under the consideration of the Stoke Newington Borough Council, which proposes a wholesale conversion of the street lighting of the borough, at an estimated total capital charge of £53,000, with, in addition, £1200 for a transformer and switchgear. By the aid of the Government scheme, the Committee who have been considering the matter are of opinion that the loan charges would be reduced from £3250 per annum to £1112 10s. The Committee recommended that the scheme be carried into effect, and that notice be given to the Gas Light and Coke Company to terminate their agreement on March 31 next. Now, when one bears in mind that public gas lighting can be modernized by using improved burners at considerably less cost than is involved in converting from gas to electricity, one wonders whether the Stoke Newington Committee have been paying more regard to the interests of the electricity undertaking than to the pockets of the Government and of the ratepayers in proposing this scheme of conversion. It seems to us very clear that they want to do a good turn to the business of the electricity undertaking—perhaps as much as to unemployment; and now, in their opinion, is the cheapest time, with the Government helping, for doing the work. However, there was a long discussion on the subject, which was adjourned *sine die*. The Birmingham Corporation, on the other hand, have their eyes on inside lighting and distribution extensions as providing scope for relief schemes. They propose to instal electric lighting at twenty-four schools at a cost of £10,850, and electric lighting at eleven libraries at an outlay of £1100. Cable laying between the Nechells and Summer Lane generating stations is contemplated at a cost of £9550; and main extensions are proposed in the outer parts of the city at an expenditure of £30,550.

Small House Supply.

There seems to be at present a tendency among some municipal bodies owning electricity concerns to speculate fairly heavily in the wiring of working-class houses. Attention was recently called [*ante*, p. 180] to the decision of the Hackney Borough Council to expend a further £10,000 on prepayment installations, although they are not sure as to the results of the first £5000 expended in this direction. Now the Sheffield Corporation are proposing the expenditure of £10,000 also for the same purpose. There is no definite decision yet as to which of two schemes shall be adopted. One of them is: The Corporation to instal the wiring and fittings, including lamps, and the tenant to pay a quarterly rent for the use of the installation; the elec-

tricity consumed to be paid for through a slot meter, or by quarterly account. The second scheme is: The Corporation to instal the wiring and fittings, including lamps, and payment to be made by the tenant by means of a slot meter adjusted so as to include the cost of the installation in the price charged per unit. The average consumption per annum may be taken as 80 units per house. Calculating on a period of nine years, the rental will be 6d. per lamp per quarter, or an addition of 1½d. per unit. The Electric Supply Committee rather like the second scheme. Here again, though the scheme involves an expenditure of £10,000, the Chairman of the Committee (Mr. Councillor Ward) frankly admits that it is merely an experimental one, with the view of encouraging the use of electricity in the smaller houses in the city. Evidently the Council are not proposing to expend much on each installation, seeing that they reckon the £10,000 will fit-up 2000 dwellings, which averages out to the small sum of £5 per house. The wiring is to serve four lamps per house; and it is said that the system of wiring to be adopted is a new, cheap, and reliable one. We should not like to question the cheapness, if the £5 includes a prepayment meter. The subject of the wiring of tenement property has also been discussed at a meeting of the Electrical Society of Glasgow. Various suggestions were made as to how the problem could be tackled. Among other interesting points was the statement that only 14,000 out of about 250,000 houses in the city are wired. The responsible officials of the Gas Department will be interested to learn that Mr. R. B. Mitchell, the City Electrical Engineer, is arranging to meet representatives of the property owners and house factors to discuss the matter. We wonder what he will say to them. Perhaps the Gas Department can supply him with a few reliable figures as to gas upon which comparisons could be made by the property owners and factors.

Rural Beauty and Overhead Transmission.

The good people of Cuckfield and Lindfield are very much exercised over the proposal of a Company to supply their districts with current, using the overhead transmission system and unsightly poles. There is no objection to an electric supply—in fact, some of the residents would welcome it. But they would rather be without electricity than with it (despite its well-proclaimed virtues) if the old-world villages, with their mass of natural beauty, are to be disfigured. The consent of the Ministry of Transport has to be obtained to the erection of the poles; and, owing to the widespread resentment, there has been a public inquiry into the matter. At this the feelings of the inhabitants were expressed by many prominent residents, as well as by Counsel for the local authorities. The danger of the poles with the large amount of motor traffic through the villages was pointed out, as well as the risks arising from overhead transmission, and the breaking of the wires in stormy weather. The injury to the amenities of the area was strongly presented. There would have been no antagonism if the plan had been to take into the district a supply by the unobtrusive underground system. It was the act of "vandalism" to which objection was taken. The question of price was incidentally raised. The Company are proposing 1s. per unit; and one witness stated that for his own house he is generating with a private plant (the system is not stated) at from 7½d. to 9d. per unit. At 1s., therefore, the Company are not likely to get this householder as a customer. The upshot was that the inquiry was adjourned *sine die*, as it was believed that a conference would result in an amicable arrangement.

An Electrical Engineer at the Gas Exhibition.

No doubt several electrical engineers were among the 80,000 people who visited the National Gas Exhibition at Birmingham, during its all too short career. There was one electrical engineer who apparently went filled with sarcasm, but left with the knowledge that the gas industry is not standing still in its applications of gas, but is making substantial headway. He has given his impressions in "Electrical Industries." There is a feeling on his part that neither the gas nor the electrical industry has really learned how exhibitions should be run; but he is careful not to tell us how or in what way improvement could be made. This is a pity, because he has thereby lost a fine opportunity. He was struck by the electric-fans in use, and by the gas-engine stalls beautifully illuminated by electricity, and equipped by electric motors. He omitted to point out that the lights and the electric motors were issuing warnings to the electrical engineer, while demonstrating to the public that, *vid* the engine using town gas, in all large establishments and factories, light and power can be obtained the electrical way (if so desired) at a cost substantially below the average charge for electric lighting and power with the current drawn from town electric cables. Some electricians are contemplating this form of competition with dismay; others attempt to be satirical, which is rather foolish. This private electricity generation business is growing, and not diminishing. Factory and cinema proprietors, and those who run large emporia, are talking of this means of making their establishments self-contained in the matter of light. Some are doing it; others are considering it, and the annual saving is alluring. We are sorry the electrical visitor felt distressed at seeing linen being pressed with a gas-heated iron. There are many thousands of these irons in use in homes and laundries. The users are not distressed; and they would know that the profession of distress on the part of this easily and unnecessarily disturbed electrical engineer was all bunkum. However, at last we come to something that actually impressed the electrical visitor. He describes the gas heating and cooking appliances as being really interesting, and as representing the high-water mark of gas work to-day. This country leads in gas cooker and fire design; but very unkindly, or very unintelligently, or (shall we say?) untruthfully, this engineer states that the modern types are based on American and Continental design. He concedes that some of the constructions are handsome; also that the list price of certain of the "elaborate cookers" appears to be decidedly low. This Rip van Winkle has just learned that development is moving towards the jacketed gas-oven. Gas-fires, it appears, have nothing very new to show "so far as the elements are concerned," though in the fires there is a wider variety of styles and finishes than in the electric fires, "good as the latter may be." It is pointed out that the gas-fire is not portable; while for a long time the portability of the electric fire has been emphasized as a great asset. Nevertheless, portability is rapidly ceasing to be of importance so far as the standard electric fire is concerned. The fact is the low heating power of the portable types seriously limits their use; while larger patterns are not exactly things with which to walk about. The built-in gas-fires for bedrooms, &c., attracted the attention of the electrical visitor; and he urges the makers of electric fires to give attention in this direction. He sees no reason why electric fires should not in many positions be permanently connected without any flexible cord or plug, and with switches at convenient levels on the walls. There is no reason whatever, if people can afford to have them for the same time-use as gas-fires. However, in the end, we find the electrical visitor inclined to question whether an exhibition has the same permanent value as a generously designed and well-furnished showroom. Perhaps it has not; but exhibitions are proved to be capable of giving a good fillip to business, and of gaining publicity of an order which showrooms cannot command.

"DUROSIL."

A New Glass for Laboratory Use, Gas Lighting, and Domestic Purposes.

The manufacture of heat resisting and laboratory glassware is a trade essentially of a specialized character. This is as it should be, since the conditions under which much of this glassware has to be used are such that it should be made by highly-skilled men. The strains to which the glass is liable have to be provided against by chemical and physical means in its manufacture; and it is imperative that every part of the process should be carried out with that precision which can only be assured by strict technical supervision of each detail. These considerations call for a degree of organization and equipment which every firm does not possess; and it was these considerations also which made us so interested when circumstances brought us into contact with the firm of Messrs. Duroglass, Ltd, whose works are situated at Blackhorse Lane, Walthamstow, E. 17.

The firm have a large and modern works excellently equipped and staffed; and in the laboratories those tests are taken to ensure that the quality of the production shall be consistently as high as possible, and in all respects that which is best calculated to give the largest measure of durability. Especially interesting is the new heat-resisting glass placed on the market by this firm, under the expressive name of "Durosil." Its composition is no secret, being a boro-silicate glass. Beakers and flasks made of this material, which is clear and transparent, with a golden tinge, may be placed directly on a bunsen flame, even when wet, without the use of gauze or other form of protection; and when heated to a temperature as high as 225° C., they may be plunged into cold water without fracture. Even when blown heavier than usual, such apparatus fulfils all the requirements of laboratory ware, with the additional advantage that it withstands rough usage. Water may be evaporated to dryness over a bare flame in articles made of Durosil—such as basins, for instance—and therefore for many purposes it presents a substitute for porcelain. The attack of acids on this glass is negligible, while alkali solutions have only a slight effect on the surface unless in high concentration.

Another point to be noticed is that Durosil is equally suitable for all classes of lighting glass where the conditions are extreme. Gas shades and chimneys, for example, will stand the direct heat of the flame without fracture. This feature necessarily results in a considerable reduction in expenditure—a property of great importance not only to the large consumer, but also to every householder. Lighting glass, we understand, is now a very appreciable part of the firm's production, and arrangements have been made for a considerably increased output of this branch of their manufacture.

Oven-ware is the latest interesting addition to the many uses of Durosil; and cooking vessels of various descriptions are being manufactured. The advantage of glassware for cooking purposes cannot be over-rated. It is hygienically perfect, and there is no danger of contamination such as possibly may arise with iron, copper, and enamel vessels. Its resistance to acids and alkalis precludes any possibility of this taking place, it is clean in use, and its endurance at high temperatures makes it a reliable adjunct to the household.

FOLESHILL GAS-WORKS, COVENTRY.

Official Inauguration of the Second Section and Glover-West Vertical Retort Installation.

A large party, comprising members and officials of the Coventry Corporation, and a few visitors, assembled at the Foleshill Gas-Works last Thursday morning for the official inauguration of the second section and vertical retort installation, a full account of which is reproduced below from an illustrated brochure prepared for the occasion. The Mayor (Alderman W. Hewitt, J.P.), the Deputy Mayor (Alderman W. H. Grant, J.P.), Councillor W. Cleverley (the Chairman of the Gas Committee), Councillor F. W. Kimberley (the Vice-Chairman), and Mr. A. Mackay (Chief Gas Engineer to the Stoke-on-Trent Gas Department) were among those present. The Contractors were represented by Alderman Fred J. West, J.P., and Mr. Ernest West (West's Gas Improvement Company), Mr. W. S. Clapham (Messrs. Clapham Bros.), Mr. P. Holmes (Messrs. W. C. Holmes & Co.), and Mr. A. J. Bird.

After assembling in the office of the Engineer and Manager (Mr. P. N. Langford), a move was made to the Glover-West vertical retort-house, where the brief formal opening ceremony was performed.

Councillor CLEVERLEY said that, in asking his Worship the Mayor to perform the ceremony of officially opening the second section of the works and the vertical retort installation, another epoch was marked in the history of the Coventry Corporation gas undertaking. It was in June, 1909, that the Foleshill Gas-Works and the first section of carbonizing plant erected thereon was officially inaugurated by the then Mayor (Alderman William Lee, J.P.), whom he was delighted to see with them that day, together with other members of the Council who were present on that occasion. The development of the undertaking during the fourteen years which had elapsed was illustrated by the fact that the annual make of gas had increased from 796 to 1687 million c.ft., equal to 112·3 p.ct. In June, 1919, Mr. H. E. Caldicott, who was then Chairman of the Gas Committee, submitted to the City Council a recommendation for extensions of the coal-gas plant estimated to cost £425,000. He presented the case in such a concise and comprehensive manner that it received the unanimous approval of the Council. The extensions were to comprise an entirely new section of manufacturing plant of a capacity of 4½ million c.ft. a day, to be erected in two instalments of 2¼ million c.ft. each. In the first instalment it was essential, for economies both in design and working of the plant, that mains and many items of the auxiliary plant should be of a capacity to function for the complete section, leaving only the additional carbonizing plant for the second instalment when required. The first portion now completed had been at work for several months; and the results from the plant, both as regarded output of gas and residuals, were well above the guaranteed figures. The question which type of carbonizing plant to instal received most careful thought and patient investigation by the Engineer and the Gas Committee, as considerable developments in gas manufacture had taken place, due to the removal in the war period of irksome restrictions imposed by ancient Acts of Parliament. Gas-works in various parts of the country were visited by the Engineer and Gas Committee, with the result that the Committee were unanimous in recommending the Council to adopt the system which they were inspecting that day, as being the most suitable in every respect for the requirements of Coventry. It was with great pleasure that he asked the Mayor formally to declare open the second section of the Foleshill Gas-Works.

The MAYOR said his words would be very few. In every detail Section No. 2 of the works was now complete; and in declaring it open, he wished it every possible success. [Applause.]

On the proposition of Alderman WILLIAM LEE, the Mayor was cordially thanked for performing the ceremony.

Proceeding to the rotary wagon tippler, the Mayor tipped a load of coal; and then in groups the visitors inspected the new works, under the guidance of Mr. Langford, Mr. C. F. Tooby (Works Manager), Mr. J. H. Hardy (Engineering Assistant), and other members of the staff. During the tour opportunity was offered—and fully taken advantage of—for the passing of commendatory remarks on the work carried out.

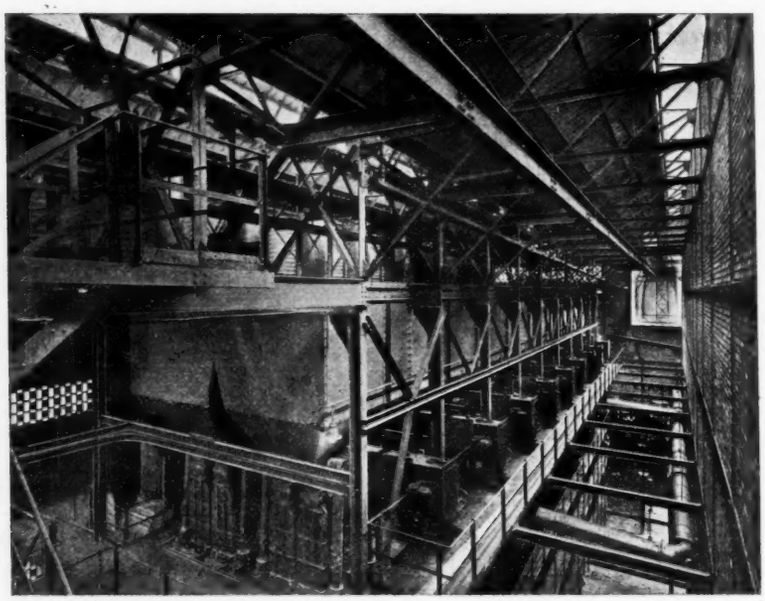
THE WORKS.

HISTORY AND STATISTICS.

The Coventry gas undertaking was acquired by the Corporation in the year 1884; the purchase price being agreed with the Gas Company at £170,345. For that year the gas output was 185 million c.ft., the capital, therefore, working out at the rate of about 18s. 5d. per 1000 c.ft. The growth of the undertaking has been exceptional. From 1884 to 1923, a period of 39 years, the yearly make of gas has increased from 185 to 1687 million c.ft., a rate equal to 5·8 p.ct. compound—that is to say, it has doubled every twelve years. The total capital expenditure to March 31, 1923, was £707,666, while the loans outstanding amounted to £578,541; the capital per 1000 c.ft. then being approximately 6s. 10d. Forty-two miles of street mains had been laid up to 1884. Since that date 137 miles have been added, making a total of 179 miles. The consumers now exceed 35,400.

In the first year after the purchase, a surplus profit of £309 was made; and never at any time has the undertaking been subsidized out of the rates. On the other hand, a total amount of £97,514 has been transferred to the credit of the general district

AERIAL VIEW OF THE FOLESHILL WORKS.



INTERIOR VIEW OF THE GLOVER-WEST VERTICAL RETORT-HOUSE.

Showing the Supply of Coal to the Retorts, and the Gas Off-takes and Mains.

fund from the surplus profits made by the gas department. To meet the large increase in the demand for gas, which steadily went on after the Corporation had acquired the undertaking, additional plant was laid down for its manufacture, until the site of 4¼ acres, upon which the old Gas Street Works stood, became so congested that it was apparent another site must be obtained. Hence the purchase of the site of Foleshill was arranged; and the Gas Act obtained by the Corporation in 1898 gave the necessary powers to build a gas-works thereon. Building operations were commenced on the new site in 1902. The first section of the works was completed and put to work in 1908.

At this time the old Gas Street Works were closed for the manufacture of gas, and it was decided to use them in future as a central storing and distributing station only. The gas manufactured at Foleshill is sent from the holders there into the Gas Street holders for distribution, by two powerful Rateau type boosters, through a 24 in. main. Four more districts are served direct from the driving main through district governors installed on the route from Foleshill to Gas Street.

Foleshill Site and Lay-Out.

The Foleshill site is not an ideal one for a gas-works, though the best at the time reasonably available for the purpose. It is a little over 44 acres in extent, and about half-a-mile long; but it is not by any means a shapely piece of land. There is only a frontage of 40 yards for a main entrance on the Foleshill Road. At the farther end of it the Coventry and Nuneaton branch of the London, Midland, and Scottish Railway crosses, severing an odd 7 acres or so from the main site. This 7 acres is at a higher level than any other part of the site, and was apportioned for the gas-holder station. Two 48-in. mains are laid in a subway under the railway (inlet and outlet mains for the gasholders), and are of ample size to pass all the gas manufactured when the works is on full output. On the side opposite the canal, part of the land juts out centrally from the main body of the site. Accompanying these drawbacks, too, were considerable variations in the levels—one part is as much as 22 ft. below, and another 17 ft. above, the finished level. The level adopted for the finished ground-level of the works was that of the works entrance on the Foleshill Road—6 ft. above the water level of the canal, and about 2 ft. below the railway crossing the site. These abnormal differences in the natural levels necessitated, in levelling the site, taking off and filling in some 150,000 cubic yards of earth. There was, in fact, a vast amount of heavy preparatory work performed which is not apparent now that the site is developed and brought to a uniform level.

The careful thought and prevision given to the lay-out of the first section of the works is shown by the fact that due provision was made at all points for the accommodation of future sections, and for convenient extension of such buildings for housing plant and machinery of subsequent sections as should, for economy in working, be grouped with the plant and machinery of the first section. Round the works superintendent's office—in the centre of the site—are grouped workshops, stores, and power station buildings, a point contributing to efficiency on a works covering such a large area. Another feature worthy of note is the main road starting from the entrance gates. Passing the front of the water-gas plant, and running the full length of the site to the railway sidings at the opposite end, it separates the part of the site devoted to production from that reserved for purification and other processes. This roadway is 40 ft. wide.

Railway Sidings and Canal Wharf.

Alongside the Coventry and Nuneaton branch line of the London, Midland, and Scottish Railway a siding has been constructed, at the expense of the Corporation, specially for the Foleshill Gas-Works. From this siding lead the works sidings, which make a complete circuit of the site, giving upwards of a mile of main sidings, with branches leading to various parts of the works—totalling, for the whole works, about 3 miles. Two weighbridges with weigh offices are installed, one for wagons entering the works, the other for outgoing traffic. On the canal side a wharf is built which gives accommodation for four boats, and close by are measuring tanks for loading cyanogen liquor into boats. A branch siding, with an inclined way at each end, runs alongside the wharf; and side-tipping wagons used for moving coke, ashes, &c., on the works, deliver direct into the boats. At the present time two locomotives are employed on the works.

No. 1 Section.

The first section of the Foleshill Works was erected to the designs of the late Mr. Fletcher W. Stevenson, and comprises, with accessory plant, the following.

Horizontal Retort House.—Capacity 4½ million c.ft. per diem, containing 32 settings each of eight retorts, 20 ft. by 22 in. by 16 in. ⏢ section, heated on the Klönne regenerative system, and operated by two electrically-driven Fiddes-Aldridge simultaneous charging-discharging stoking machines. The coal stores adjoining have a capacity of 5000 tons.

Coke Yard and Screening Plant.—Granite sett paved coke yard with two elevated coke-tipping gantries worked by rope tramways. Two sunk docks for loading coke into railway wagons. Three power-driven coke screens and hoppers under open steel roofs; and "Two-Unit" Gordon-Harvey mechanically-operated coke-breeze washing plant.

Carburetted Water-Gas Plant.—Two sets (Humphreys and Glasgow type), originally of a combined capacity of 1½ million c.ft. of gas per diem. This plant was removed from the Gas Street Works, and re-erected in new buildings. The generators have since been enlarged to produce 1¾ million c.ft. per diem. As an expedient, to cope with the abnormal increase in the demand for gas during the last years of the war, a 1½ million c.ft. per diem blue water-gas set was installed in 1918.

No. 2 Section.—The Vertical Plant.

Extensions of carbonizing, washing, and scrubbing plant were sanctioned by the Council in June, 1919, and work on the site was actually commenced in July, 1920. Though the immediate extension provides carbonizing plant for an additional 2½ million c.ft. of gas per diem, the scheme covers an entirely new section of the works for a capacity of 4½ million c.ft. per diem on a straight coal-gas basis; the latter size being the most suitable and economical for a complete section of the Foleshill Works.

Before a decision was made upon the type of gas-making plant to adopt, thorough investigation took place of all the most modern types and processes, and various plants in actual work were inspected by members of the Gas Committee, together with the Engineer. It was decided that the most suitable would be a system of vertical-retort carbonizing plant, efficient for straight coal gas, and in which steaming could be economically carried out. Such a plant would provide flexibility of working to meet possible varying future requirements, both as regards output of gas and coke and calorific intensity of gas. Having regard to

existing features and future development of the site, the best position for the retort-house was at the far end adjoining the railway sidings. The lay-out evolved by the Engineer gives every facility that could be desired for weighing and handling both coal taken in and coke and other residuals going out over the sidings, or by lorries over the main roadway through the works.

FOUNDATIONS.

A large portion of this area occurs where the deepest filling-in had been necessary in the original levelling-up. Trial holes were sunk, and it was found that the natural ground formed practically a water-tight basin, waterlogged, except in very dry weather, to within 4 or 5 ft. of the surface. In parts it was necessary to go to a depth of 30 ft. to secure a satisfactory foundation for the heavy loads; and the Engineer decided that pile foundations should be generally adopted.

The piles are of the "Simplex" cast-in-place type, 16 in. in diameter, 323 in number, and of a total length of 6167 ft. A hollow steel tube called the "form," fitted with a loose enlarged point or cast-steel shoe, is driven into the ground by a pile driver until the required set is obtained. Longitudinal reinforcement is then inserted in the tube, consisting of six ¾-in. round steel rods bound together circumferentially with steel wire and stirrups at regular intervals, to ensure that the reinforcements are kept symmetrical and in the correct position. The driving tube is filled with a fine mixture of portland cement concrete, and then slowly withdrawn by means of tackle with which the pile driver is equipped. During the process of withdrawing the form, the concrete issues from its lower end, completely filling the hole made by the tube, and also filling voids in the sides of the hole should any occur through the displacement of stones or boulders in driving the form. In process of setting, the concrete cements itself to the surrounding earth, thus developing whatever skin friction the ground may be capable of affording. Reinforced concrete pile cap or sill beams are then constructed, binding the heads of the piles together in groups, to form the foundations for settings, stanchions, and walls.

As examples of the exceedingly heavy concentrated loads to be provided for, a group of eight piles under one retort-setting carries a total load of 248 tons over an area of 141 sq. ft., while under the bench stanchions groups of five piles carry 154 tons over an area of 64 sq. ft.

THE COAL-BREAKER PIT.

The coal-breaker pit, 29 ft. 6 in. by 17 ft. and 28 ft. 6 in. deep inside, is completely underground, and constructed entirely in reinforced concrete. An offset, 6 ft. down and 5 ft. wide all round, was taken advantage of to form a horizontal beam round the pit, to reduce the thickness of the walls. Destined to withstand water pressure on the outside to a head of within a few feet of the top, the pit has been made absolutely watertight without resort to anything but good-quality dense concrete and high-class workmanship. Close-timbered excavation was sunk to a depth of 31 ft., the first 20 ft. through made ground consisting of sandy marl and clay, and the remaining 11 ft. below the maiden soil through marl and clay, on to a good firm clay bottom. Continuous pumping was necessary. The treacherous nature of the made ground after spells of heavy rain, also the close proximity of the canal and railway siding, necessitated very heavy timber strutting. The works railway siding passing near the end of the pit was maintained in constant use during the whole period the work was under construction.

For the concrete in foundations and structures, only the very best portland cement and cleanest graded granite chippings were used, every batch accurately proportioned and efficiently mixed. All consignments of cement were stored, sampled, and tested, and not released for use until results proved that the cement complied in every way with the stipulated tests. Test cubes were regularly made from the concrete put in all sections of the work, matured, and tested. Results obtained from tests throughout confirmed the high quality of the concrete made. Samples of steel and other materials were also tested and examined before their use was sanctioned.

CARBONIZING PLANT.

The carbonizing plant consists of 72 Glover-West vertical retorts arranged in one bench of nine settings with a nominal capacity of 2½ million c.ft. of gas per diem on a straight coal-gas basis, or 3 millions per diem under steaming conditions. The retort-house, with the coal-store in line, is arranged within a curve of railway track, so that coal is received direct from the wagons and conveyed either to store or to the retort-bench; and the coke, handled by a system of telpherage, is also delivered direct to the railway wagons, after passing through the screening plant.

VERTICAL RETORTS.

The retorts are of the well-known Glover-West type, 20 ft. 6 in. long and 33 in. by 10 in. in cross-section at the top, increasing to 39 in. by 18½ in. at the bottom. They are arranged four in a series of horizontal combustion chambers built in "floors" around the retorts. In the first floor, secondary air is circulated, taking heat from the outgoing residual coke in the retorts before passing to the combustion chambers. The next five floors are combustion chambers. In the three top floors the waste gases are circulated, giving heat to the incoming charge of coal before proceeding to the chimney. Each setting of eight retorts, comprising two series of chambers with four retorts each, is provided with fuel gas generated in a producer at ground level. The producers are fitted with step-grates with open fronts; the quantity of producer gas made being controlled only by the chimney draught. Steady working, constant quantity and quality of fuel gas to the setting, and ease of attendance are thus obtained.

WASTE-HEAT BOILERS.

Each setting of eight retorts is provided with an independent chimney, at the base of which is arranged a water-tube waste-heat boiler of the West-Galloway type. Sufficient heating surface is provided to raise the steam necessary for the service of the retorts when making gas at 450 B.Th.U. and 20,000 c.ft. per ton, with at least one of the boilers standing by. Steam is generated in the boilers at 80 to 100 lbs. per sq. in. pressure and superheated to 500° Fahr. It is reduced to 20 to 40 lbs. per sq. in. at the retorts, to which it is fed through graduated nozzles. The average temperature of the steam entering the retorts is from 350° to 400° Fahr.

COLLECTING MAINS.

The collecting main is constructed with an inclined bottom. The primary condensates are retained in the main by the provision of a weir at the lower end, where the gas passes to the foul main through a 12 in. valve and pipe. A 6-in. tar valve is fitted to the lowest portion of the main, so that the condensates can be flushed-out periodically.

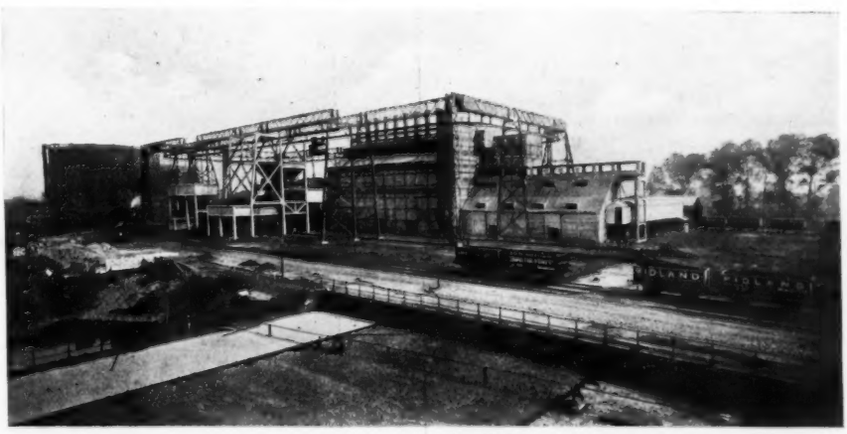
The gas from the several collecting mains of the retort-bench is carried through 18-in. mains to two 14-in. Cowan retort-house governors, uniting into a 24-in. main leading to the condensing plant. The condensates pass, together with the gas, to the seal-pots beneath the governors, where they are separated out and led to the tar and liquor well.

DISCHARGE OF COKE.

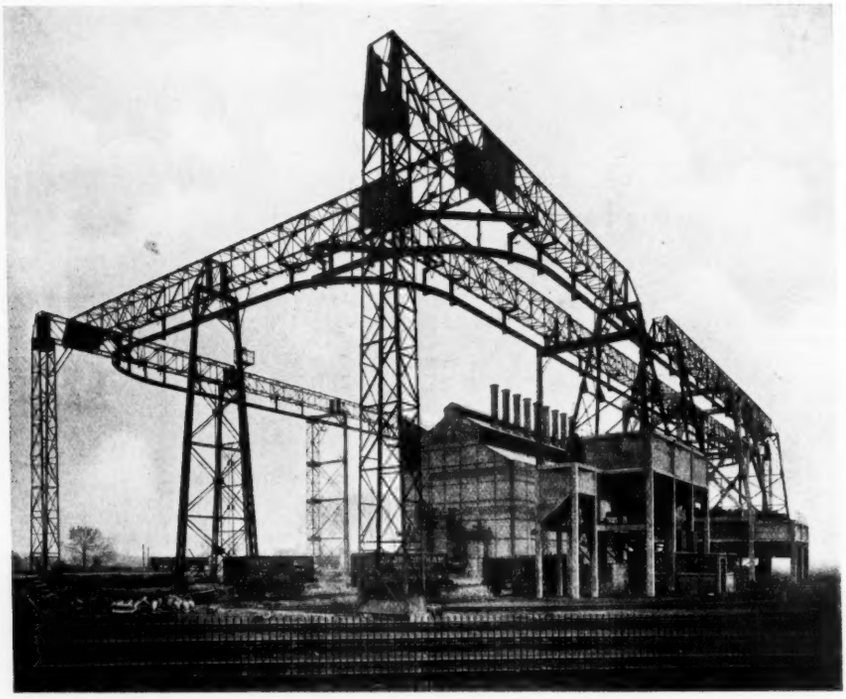
The rate of flow of the charge through the retort is controlled by the rate of discharge of the residual coke. The Glover-West coke extractor takes the form of a helical inclined plane, or worm, upon which the entire charge in the retort rests. A very slow motion, therefore, of the plane from beneath the charge is sufficient to release the coke very gradually and to lower the charge in the retort. The coke falls temporarily into a cast-iron chamber, whence it is discharged to skips every two hours by opening the self-sealing doors.

COKE TO PRODUCERS AND RETORTS.

Coke is fed to the producers from a suspended skip running easily on ball bearings. The skip is supplied from a hopper filled with unscreened coke by the telpher. The retorts require to be



GENERAL VIEW OF THE VERTICAL RETORT INSTALLATION.



GENERAL VIEW OF COKE-HANDLING PLANT.

filled first with coke before starting-up, after periodical scurfing, and after a cessation of work for any other reason. Coke for this purpose is charged by a suspended skip, similarly to the producer feed; the coke being elevated from the ground level by means of an electric lift. This is capable of raising a net load of 20 cwt., at a speed of 70 ft. per min. It is provided with all necessary electrical and safety equipment. The gates in the tower and in the cage are fitted with electric locks, so that the machinery cannot be put into motion until all gates are closed.

Retort-Bench Supports.

The retorts and settings are built upon a flooring of heavy steel girders spanning between steel stanchions on one side and engineering-brick piers on the other. Ten steel stanchions rest on reinforced concrete pile-caps, each spread over a group of five piles; while the brick piers and producers are carried on a continuous reinforced concrete pile-cap resting on 78 piles.

Retort-House Building.

The retort-house is a steel-framed building, strongly braced to the retort-bench structure. The panels are filled in with a selected red brick. Careful attention has been paid to the ventilation and lighting, with the result that operations in the house are carried out under healthy conditions. Reinforced concrete strip beams (21-ft. span to load fully the piles provided) carry the curtain walls, and these beams pick-up the point loads from the steelwork side framings.

Coal-Handling Plant.

The coal-handling plant is designed in view of the future extension of the carbonizing capacity by the installation of another line of coal-store and retort-bench, parallel to that already working.

A train of coal entering the works over the sidings weighbridge is placed on the "full-wagon" siding by the gas-works locomotive. From this siding, which is laid perfectly level, and has accommodation for sixteen wagons, the wagons are hauled one by one (by means of an electric capstan and loose rope) on to the platform of a Babcock and Wilcox patent electrically-operated rotary wagon tippler, and clamped securely in position. The motor actuating the gear is then started, and the tippler is revolved until the wagon is tilted to any desired angle, or to an inverted position. Coal is thus completely discharged from the wagon into a 20-ton receiving hopper below rail level in the coal-breaker pit, over which the wagon tippler is centrally arranged. To bring the wagon back from the inverted position into correct alignment with the siding rails, the tippler motor is reversed.

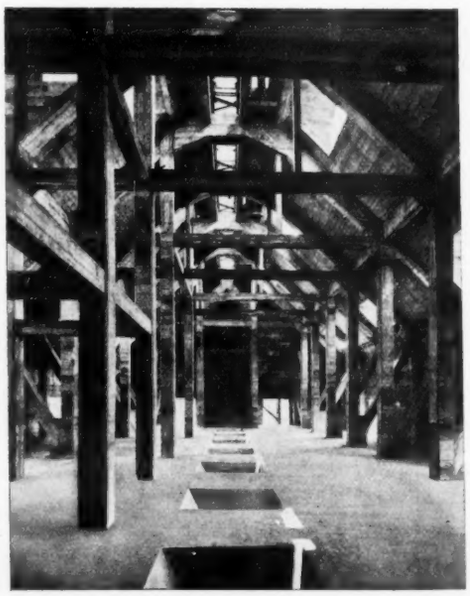
A brick-panelled steel-framed open-ended building covers the breaker pit and wagon tippler. Leaving the tippler platform, the rails have a slight inclination, and the next full truck placed on the tippler by the electric capstan moves the empty truck forward, to be marshalled and coupled on the empty-wagon siding, whence the train is removed by the works locomotive. The electric capstan installed is of the most modern "totally above-ground" type, actuated by foot pedal.

Housed in the coal-breaker pit, and under the receiving hopper, is a heavily-designed West double-roll breaker, capable of breaking 50 tons of hard gas coal per hour to the size necessary for carbonizing purposes. Below the breaker is a rotary filler, by means of which the broken coal is fed to the buckets of the cross conveyor capable of transporting 50 tons of coal per hour, either to the coal-store conveyor at present installed or to the conveyor to be installed in the future extension. This cross conveyor is supported in a covered braced-steel gantry running at right angles to the centre line of the coal store and retort bench. For driving the coal breaker and cross conveyor a 28 H.P. electric motor and "Coventry Chain" reduction gearbox are installed above ground.

Coal Store.

The coal store, 104 ft. long by 50 ft. wide, is constructed with reinforced concrete sides, floor, underground tunnel, roof, and internal bracing, to resist the pressure of the coal, in one monolithic structure. Its capacity is 2500 tons of coal. The sloping roof more or less follows the angle of repose of the coal when the store is full, and the apex of the roof is constructed in the form of a gallery for the upper strand of the gravity-bucket conveyor. Beneath the floor the lower strand is accommodated in a tunnel 8 ft. 9 in. wide, 9 ft. deep, with nine hopper mouths for discharging purposes. Each mouth is provided with a West duplex valve, by means of which coal is fed from the store to a travelling rotary filler running on rails parallel to the conveyor tracks. Above the coal store is constructed a telpher rest house to accommodate two machines, with retort-house men's mess-room under.

A 50 tons per hour gravity-bucket conveyor, driven by a 12 H.P.



Interior of Ferro-Concrete Coal Store.

electric motor through a "Coventry Chain" reduction gearbox, receives coal from the cross conveyor, and is led over the coal store, rising vertically within the retort-house, along and over the coal storage bunkers of the retort-bench. The return strand descends at the same end of the retort-house, and passes below the coal store floor. It is thus possible to take coal from the railway wagons direct to the coal bunkers of the retort-bench, or to the coal store, or from the coal store to the retort-bench. The gravity-bucket conveyors are of the well-known West type, with stamped steel renewable bush chains, self-oiling rollers, and steel-riveted buckets. Each bucket is provided with side cams, which engage with adjustable dumpers arranged in the tracks at all points where discharge may be required.

Coal Bunkers.

Some 360 tons, or forty-eight hours' supply, of coal to the retorts can be stored in the coal bunkers above the retort-bench. The bunkers are constructed within the structure of the retort-house, supported by extensions to the buckstays of the retort-bench, and formed with cones, outlets, and slide doors opposite each of the retort coal-feed valves.

Coke-Handling Plant.

Coke is discharged from the coke chambers of the retorts into skips, mounted in ball-bearing carriages, which are pushed clear of the bench. They are then lifted by a telpher machine running on a track arranged 60 ft. above the retort-house floor level and extending through the retort-house, over a considerable area of yard storage, and over the several hoppers of the coke-screening and breeze-washing plants. The track is supported from the roof principals in the retort-house and alongside it, and from latticed steel girders carried by steel-framed stanchions in the yard resting upon reinforced concrete piles and pile caps. Advantage is also taken of the structure of the coke-screening and washing plants storage hoppers to support the portions of the telpher track adjacent thereto. By the arrangement of telpher track, wherein a length for the future adjoining retort-house is provided, the coke can be transported from the retort-house to coke hoppers or storage ground in two directions. When this section is completed, the telpher track will make a complete circuit of the site.

Coke-Screening Plant.

The coke skips are conveyed by the telpher machine, and discharged into either of two reinforced concrete receiving hoppers over the two sets of breaking and screening plant. Each overhead hopper has two outlets. The first outlet delivers the coke by means of the reciprocating feeder into a short screen, which separates it into two sizes—through or over 1¼ in. mesh. The large coke falls into one compartment, and the small into the elevator buckets by which it is delivered to a coke cutter. Alternatively, the second outlet and reciprocating feeder delivers coke direct from the overhead hopper to the coke cutter. From the cutter the broken coke passes to a long rotary screen, and is graded into five sizes including dust, falling in order of size into separate compartments of the reinforced concrete storage hoppers. Each hopper is provided with mouth and door to deliver coke or breeze into railway wagons or lorries as required. The screening plants are in duplicate. The machinery of each is actuated by two 5 H.P. electric motors and one 12 H.P. through "Coventry Chain" reduction gears; the whole being very carefully enclosed against the action of the coke dust.

Contractors.

The contract for the carbonizing and coal and coke handling plants was confided to West's Gas Improvement Company, Ltd., Manchester, the patentees and manufacturers of the Glover-West vertical-retort system. For the foundations and ferro-concrete work, included in their contract, Messrs. West's engaged as consulting engineer Mr. Bernard Green, M.Inst.C.E., to whose designs this portion of their contract was carried out.

Coke-Breeze Washing Plant.

This plant consists of three mechanically-operated units, each dealing with 5 tons of sized coke per hour, erected and complete with ferro-concrete structure, overhead receiving hoppers, water-settling tank, and engine room, by the Gordon-Harvey Company. The design in general is similar to the two-unit plant successfully installed in 1918 for No. 1 Section.

Graded coke from the coke-screening plant (on the same line of telpher track) is elevated in tipping skips into the storage hoppers by the telpher. From the hopper mouths coke is delivered through adjustable paddle feeds, at a determined rate, into rotary washing pans. Coke overflows with the water from the pans over a draining chute into railway wagons on the siding alongside. Sinkers are dumped at regular intervals through double door valves, fitted at the bottom of the washing pans, into a settling tank below. The water from the draining chute returns to the settling tank, and is circulated through the washing pans by a 12 in. diameter belt-driven Tangye centrifugal pump. The silt and sinkers are raised from the settling tank by a chain and bucket elevator into an overhead receiving hopper, which has an outlet and geared door to discharge into railway wagons. Three sizes of coke are washed, and by the method of feeding arranged each unit can deal with any of the three sizes. For driving the centrifugal pump, washing pans, paddle feeds, and silt elevator, a 34 B.H.P. National gas-engine is installed in an engine room constructed under the operating platform.

Condensers.

For cooling the gas immediately it leaves the retort-house, two Clapham water-cooled tubular condensers, with 24 in. diameter valves and connections, are erected on a pile and pile cap foundation, constructed by the Gas Department under the north gable wall. Water for cooling is circulated from the Coventry and Nuneaton Canal to the east of the site. From the condensers a 30 in. main conveys the gas to the turbo-exhausters in the power houses, and an 8 in. pipe carries tar and ammoniacal liquor to the underground storage tanks. Both gas and liquor mains are of sufficient size to function when the carbonizing plant is extended to complete the section.

Exhausters.

Two exhausters of the two-stage Rateau type, constructed by the Bryan Donkin Company, Ltd., are installed in power houses for pumping the gas from the retorts through the washing, scrubbing, and purifying plant into the holders. The machines are in duplicate, each driven by a 60 H.P. Brotherhood steam turbine, capable of passing 250,000 c.ft. of gas per hour, sufficient to deal with the complete section. All gas, steam, and exhaust connections and valves are readily accessible in the basement of the building. Provision is made in the building and gas connections for another machine for the future third section of the works, when one machine will serve as stand-by for two sections, and any machine work on either section. In the arrangement of gas connections on the outlet side, provision is also made for the two sections of washing and scrubbing plant to be changed over.

Power-House Extension.

The existing power house buildings have been extended, in two bays of 32 ft. and 24 ft. for a length of 45 ft. each (with basement 10 ft. deep under the former), for the accommodation of exhausters and extension of electric generating plant. As the existing machinery of No. 1 Section had to be in continuous operation during the whole of the time, the extension of these buildings, together with all engine beds, foundations, and equipment, was carried out by the staff of the Gas Department. The roof only was constructed under contract. Here all provision is made for easy future extension by adding another wing parallel with, and matching, the hydraulic power house. The existing travelling crane tracks in both bays are extended; and the cranes proved of great service in erecting the heavy parts of the exhausters, electric generating plant, and large gas connections.

Electric Generating Plant.

Placed in line with the existing sets are two 32 KW. direct-current generators, driven through flexible couplings by two Crossley horizontal gas-engines, with switchboard and linking-up panel to the existing switchboard. One set provides sufficient current for the night shift, and two sets are required continuously for the day load.

Boilers.

For raising the additional steam required for turbo-exhausters, pumps, and scrubber engine, a fourth Lancashire boiler is installed in the position reserved for it alongside three similar existing boilers. The new boiler is 30 ft. long by 7 ft. 6 in. diameter, fitted with "Turbine" forced-draught furnace and superheater unit. The setting was built by the Gas Department staff, who also erected all steam, feed, and blow-off connections, both to the boiler and to all engines served from it. Feed water is heated by means of a Berryman exhaust-steam heater.

Washing and Scrubbing Plant.

This consists of one Livesey washer, 36 ft. long by 7 ft. 6 in. wide by 3 ft. 6 in. deep, constructed by Messrs. Clapham Bros., Ltd., one two-section 12 ft. diameter Holmes rotary scrubber-washer driven through spur gearing by a horizontal steam engine, and two Pelouze and Audouin type tar extractors. The connections and valves are 30 in. and 24 in. The washing and scrubbing plant throughout is capable of dealing with 6 million c.ft. of gas per diem, a capacity required for the full section when completed. The foundations are of mass concrete below ground, and granolithic concrete in beds above ground, put in by the Gas Department.

Purifiers.

These consist of six boxes, each 50 ft. by 33 ft. by 6 ft. deep, with self-jointing steel covers, removed and replaced by means of a Hovey patent manual travelling crane. The purifiers are covered with a single-span open roof. Oxide revivifying sheds, 60 ft. wide, are placed alongside.

Station-Meter.

One station meter of a capacity of 100,000 c.ft. per hour, by Messrs. Parkinson and Cowan, is housed in a building at the end of the purifiers, and abutting on the main roadway.

Gas-Mains.

The gas-mains connecting-up between the retort-house and the power house through the scrubbing plant to the inlet of the purifiers, are all 30 in. internal diameter underground. They will carry the whole of the gas made when the section is enlarged to its full capacity. As far as possible the gas-mains are laid in the roadways; and where they cross made-up ground, they are supported on a steel-mesh reinforced concrete raft. Similar foundations are also provided for the smaller gas, water, tar, and liquor mains, electric cables, and surface water drains. The work in the excavation of trenches, concrete foundations, laying drain pipes and underground mains of all descriptions, together with the preparation of the site and all new sidings, was carried

out by the Gas Department staff, who also set-out the whole of the work and were responsible for all levels.

LUNCHEON.

Afterwards in the works canteen there was luncheon on the invitation of the Gas Committee—Councillor Cleverley occupying the chair. The Loyal Toast having been honoured,

The Mayor proposed "Success to the Coventry Gas Undertaking," remarking that, from what they had seen that day, and from what he had heard in conversation, he was sure it was the opinion of all that Coventry had a most up-to-date works. When the first section of the new works was opened in 1909, by Alderman William Lee (who was at that time Mayor), they thought they had reached perfection; but since then great improvements had been made in methods of gas manufacture, and in the new section these improvements had been incorporated. He was glad to think that, owing to the foresight of their Engineer, provision had been made for still further extension when necessary. He had been particularly gratified to notice the easier labour conditions of the new installation, as compared with those of former times. Since the undertaking was acquired in 1884, a total amount of £97,514 had been transferred from surplus profits to the credit of the general district fund; but gas had not been charged at an excessive rate to realize these profits.

Alderman Fred J. West said he would at this stage crave indulgence to make a presentation, as he had to hurry away, in order to be present at a similar function which was to take place at Dumbarton on the following day. He congratulated the City of Coventry and the Corporation upon the successful inauguration of the extensions at the gas-works. Those present had had an opportunity of inspecting one of the finest assets that the Corporation possessed to-day, and one of the best examples of gas practice in the United Kingdom. He said this in all sincerity; and he might tell them that, in the course of his business, it had been his privilege to visit the majority of the important gas-works in this country and a large number on the Continent and in the United States of America and Canada. The contract which it had been the pleasure of West's Gas Improvement Company to undertake at Coventry had been carried out under exceedingly happy conditions. Mr. Langford and his staff had been kind and courteous; but, at the same time, they understood how to handle contractors so as to get the best out of them. This was an experience which contractors welcomed. The gas works at Coventry were a monument to the skill and experience of the Engineer, of which they might all very well be proud. The contractors had been delighted to have an opportunity that day of seeing their work in operation; and they would like to leave the Mayor and the Chairman of the Gas Committee something by which they might remember the occasion. On behalf of the different contractors, therefore, he asked Alderman Hewitt and Councillor Cleverley each to accept an inscribed silver salver, as a memento of the successful inauguration of the new works.

The Mayor, on behalf of Councillor Cleverley and himself, thanked the contractors for their handsome gifts.

Councillor Cleverley, responding to the Mayor's toast, thanked him on behalf of the Gas Committee for the kindly way in which he had proposed success to the gas undertaking. It was a source of pleasure to the Committee that so many members of the Council had availed themselves of the opportunity of inspecting the works and the large extensions carried out during the past two-and-a-half years. He hoped that in future the visit would be repeated at more frequent intervals, so that the Council might keep in closer touch with the actual operations of the department. Such a practice would be heartily appreciated by both management and employees, and be a source of encouragement to them in the performance of their duties. It would be a useful institution to allocate certain days in each year on which the general public should be invited to inspect the works of the various trading departments of the Corporation. Such an arrangement in time would be productive of much good, and would promote among the ratepayers of Coventry a greater sense of their personal responsibilities in matters appertaining to civic administration generally. The history of the gas undertaking was a record of steady progress since its acquisition by the Corporation. From 1884 to 1923, a period of 39 years, the yearly make of gas had increased from 185 to 1687 million c.ft., a rate equal to 5 8 p.ct. compound. In other words, it had doubled every twelve years. He ventured to say there were few, if any, gas undertakings in the country that could claim such a remarkable rate of increase. The total capital expenditure to March 31 last was £707,666, while the loans outstanding amounted to £578,541; the capital per 1000 c.ft. on this figure being approximately 6s. 10d., compared with 18s. 5d. per 1000 c.ft. in 1884. When the Foleshill Works were opened in 1909, it was anticipated that many years would elapse before additional manufacturing plant would be required; but the rapid expansion of the city, and consequent increased demand for gas, both for industrial and domestic purposes, during the war period, quickly taxed the first section to its fullest capacity. Those were anxious times for the Gas Committee and the management, but he was happy to say the difficulties were surmounted without any curtailment of supply during that critical period. It was only on the completion of the first instalment of the second section of the works that this anxiety was removed, and the undertaking placed in a position to deal normally with the present demand, leaving some reserve for the immediate future. The extensions had cost £239,543, of which sum £50,000 was defrayed from revenue; and the total capital expenditure of the undertaking per million c.ft. sold per annum on March 31 last was only £406, as compared with £572 in 1909, and £920 in 1884—a striking testimony to the increased volume of business done for the capital expended, and to the businesslike policy pursued by the Gas Committee in past years, which had brought about this satisfactory state of affairs. The policy of the Committee had been to produce and sell gas at the lowest possible figure; and for many years the average price of gas in Coventry had been considerably below that of the average of other municipal undertakings in the country. On five occasions during the past two years substantial reductions in the charges had been made, and the Committee were hopeful that circumstances would permit of another reduction in the near future. The Committee had always realized the importance of a cheap service of gas to the large industrial consumers in the city, to enable them to compete in the markets of the world with their various productions; and this no doubt had contributed in no small measure to the development of Coventry in the past, and would continue to do so in the future. In conclusion, he wished to say how highly the Gas Committee had appreciated the valuable services rendered to the undertaking by the Engineer and General Manager, Mr. Langford, since his appointment in 1918, at a most critical time in the history of the department. The energetic and successful manner in which he tackled the dangerous situation, and ensured an adequate supply of gas for the winter of that year, quickly gained for him the complete confidence of the Committee. His subsequent work, in addition to the management of the undertaking, through the difficult times experienced during the past few years, had embraced the design and carrying through to completion of the scheme of extensions seen that day. As a result of Mr. Langford's labours, they were now in possession of one of the finest vertical retort installations in the country.

Mr. Langford (who met with a very cordial reception) remarked that he did not deserve all the credit for what had been accomplished. The members of his staff had assisted greatly in making the installation the success that it was now, and was going to be in the future. In this connection he wished particularly to mention two members to whom both he and the City of Coventry were greatly indebted. He referred to Mr. Hardy, the Assistant Engineer, and Mr. Tooby, the Works Manager. He (Mr. Langford) was appointed to the responsible position he now held at a critical time; and had it not been for the unswerving loyalty and great help he received from all the members of the staff, and especially from Mr. Hardy, things would not have gone so well as they had done. Mr. Tooby, also, had rendered valuable service in connection with the new installation, and in many other ways. The same remarks applied to the other members of the staff. In fact, success had been due to the united efforts of every member. The first section of the works, making 4½ million c.ft. of coal gas and 1½ million c.ft. of carburetted water gas per diem, reached its maximum normal output in 1916; and during the winter of 1917-18 the coal-gas plant had to be speeded-up far above its normal capacity (a very dangerous and costly expedient). It was fortunate, indeed, that no breakdown occurred in any portion of the plant during that period; otherwise a curtailment of supply would have been inevitable, and the result would have been most serious in its effect on the output of munitions of war from Coventry, then so urgently needed. As an expedient to meet the steadily increasing demand, the Committee installed an additional water-gas plant in 1918, which had enabled the undertaking to supply all requirements pending the completion of the coal-gas extensions. During the six months immediately following the armistice, there was a comparatively small falling-off in the demand for gas, though the output still exceeded the figures for the year 1909 by 120 p.ct. The Committee in June, 1919, submitted to the Council a scheme of extensions to be carried out in two instalments of 2½ million c.ft. a day each, at an estimated cost of £425,000. This was approved; the necessary plans, &c., in connection with the scheme were put in hand forthwith; and the main contract for the carbonizing plant was placed with West's Gas Improvement Company in February, 1920. The whole of the first instalment of the scheme was completed and put to work in March last, and had since yielded most satisfactory results.* The Chairman had told them that the extensions had cost £239,543; but it must be remembered that provision had been made in the mains and subsidiary plant in this section for dealing with the 4½ million c.ft. a day which would be produced when the full scheme was completed. The present production from No. 2 section could therefore be doubled at considerably less than half the cost of the first installation. He ventured to say it would not be many years before this instalment was rendered necessary. Since 1909 the number of consumers had increased from 19,145 to 35,234; and it was significant of the popularity of gas for cooking purposes that practically every house in Coventry had a gas-cooker. He thought eventually it would be possible to say the same of gas-fires. As a result of the new showroom and of the advertising propaganda, over 1000 gas-fires had been fixed during the year. The large part gas played in the industrial life of the city would be realized from the fact that about 40 p.ct. of the total output was used in the factories. It should be some satisfaction to the consumers to know that, though coal was costing 80 p.ct. more than in 1914, and wages were 72 p.ct. higher, yet the present price of gas was only 42·3 p.ct. above the pre-war figure. He would not be satisfied until it was considerably lower than this.

Councillor F. W. Kimberley proposed "The Contractors," remarking that the four firms concerned were heartily to be congratulated upon the manner in which the contracts had been carried out. All had been anxious to make the Coventry works a "show plant," and in this they had succeeded.

Mr. Percy Holmes, responding, declared that, so long as they had an Engineer like Mr. Langford, and a staff such as that now working under him, they could rest fully assured that the interests of Coventry would be thoroughly well looked after.

The concluding toast—"The Visitors"—was proposed by Councillor J. Holt, and acknowledged by Mr. W. H. Batchelor.

* The Contractors have obtained the permission of Mr. Langford to publish the following results measured over a period of 6 days' normal working, from June 11 to 16 of this year.

Make of gas per ton	18,280 c.ft.
Gross calorific value	477 B.Th.U. per c.ft.
Air admitted at purifiers for revivification	3 p.ct.
Therms per ton	86·6
Total weight of coke fed to producers	12·9 lbs. per 100 lbs. of coal carbonized.
Net coke for sale per ton of coal carbonized	10 cwts.

Coals carbonized—unequal mixtures of 15 different classes of Yorkshire coals, the proximate analysis of a fair sample of which gave 3·5 p.ct. moisture, 27·5 p.ct. volatile matter, 63 p.ct. fixed carbon, 6 p.ct. ash.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

THE 196th Quarterly Meeting of the Institution was held last Friday, at the Midland Hotel, Manchester. The PRESIDENT (Mr. R. E. Gibson, of Liverpool) was in the chair, and there was a large attendance. The principal business was a further discussion on Mr. W. Buckley's paper, read at Liverpool last May, on "The Maintenance Costs of Vertical Retorts," and the consideration of a paper by Mr. W. B. M'Lusky, of Halifax, on "Gas for the House." Before entering upon the business of the meeting, the members had luncheon together.

NEW MEMBERS.

New members were introduced as follows: Mr. James H. Booth, Engineer and Manager, Poulton-le-Fylde; Mr. Frederick E. M. Tooley, Superintendent at Caryl Street, Manchester.

Mr. J. Mottram, of Audley, Stoke-on-Trent, and Mr. S. Carter, of Garston, were appointed Scrutineers of voting papers.

ALTERATION OF RULES.

The new rules of the Institution, as prepared by the Committee, with a view to raising the tone of, and strengthening, the Institution, were submitted and eventually approved, with one amendment.

PUBLICATION OF TRANSACTIONS.

It was decided to resume the publication of the "Transactions," which had been stopped while the war was on; and to meet the increased expenditure, Mr. C. S. Shapley (Leeds) gave notice that he would move at the next meeting that the subscription be raised from 10s. 6d. a year to 21s.

MAINTENANCE COSTS OF VERTICAL RETORTS.

The discussion was resumed on the paper by Mr. W. Buckley (Droylsden) [see "JOURNAL," May 16, 1923, p. 414] upon "The Maintenance Costs of Continuous Vertical Retorts."

Mr. BUCKLEY said that some people appeared to think the title of the paper was incorrect, because he had included certain items which were running costs. This was so. For instance, oil was a running cost, looked at from one point of view; it was a maintenance cost from another point of view. Gas was certainly a running cost. So really the title of the paper should be "The Maintenance and Running Costs of Continuous Vertical Retorts." The members who were present at the last meeting realized that he was trying to show the total cost at Droylsden; he was not concerned with anybody else's plant. Some complimentary remarks about the results obtained had been made. He pointed out that, even after the plant had been reconstructed, they got only 79·76 therms per ton—a very good figure, but not one comparable with the 88 or 84 of which one heard. During the first six months of the current year he had exceeded this low figure; the make working out to 82·1 therms per ton. Last year the cost per 1000 c.ft. into holder worked out at 19·25d.; this year, up to date, it was 13·06d.

Mr. J. H. BREARLEY (Southport) asked for figures showing the amount of coke sold in the six months during which Mr. Buckley obtained the 82·1 therms.

Mr. BUCKLEY said he had given figures showing the coke and breeze sold; the idea being to show the quantity of breeze produced. He was rather glad the point had been raised, because he found that in many works they added to the coke sold the coke which was used in the boilers, quite apart from the retorts. When this was done, one could easily show a fictitious value in the balance-sheet as the quantity of coke. To his mind, the only figure which counted was the coke one had for sale—that which was weighed over the weighing machine for which one received cash. They carbonized coal, and they sold gas, coke, tar, and liquor. They all had to estimate the quantity of coke produced per ton of coal, and had only one definite figure to correct this estimate—namely, the weight which was indicated over the weighing machine, sold, and paid for. All other figures—coke used on producers and in boilers, &c.—were purely estimates to bring up the total coke to the amount which they thought was being produced from the retorts, whether it was 13, 14, or 14½ cwt. per ton. For the last six months his figure for coke sold was about 8·2 cwt. per ton of coal carbonized. It was low, but he could not possibly sell any more. All pan-ash was screened, and all coke which would not go through a ½-in. screen was either used on the boilers or put back in the producers. Yet, in spite of all this recovery, he could only sell about 8·2 cwt. per ton of coal carbonized. But it was coke they sold. It was all very well for people to say they could sell 9, 10, or 11 cwt. He knew one place where they sold 12½ cwt. per ton; but when he sent for a load of that coke, water was streaming out of the wagon when it arrived at a place five miles away. He objected to pay 30s. per ton for stuff that one could get from the heavens. [Laughter.] As a matter of fact, at the present time he was buying breeze. On their verticals they produced a very small quantity of breeze. The Wilton furnace he had introduced burned it, but they did not produce enough to keep it going.

RESULTS WITH HORIZONTALS AT ORMSKIRK.

Mr. W. M. CARR (Stretford) stated that since they had the pleasure of hearing Mr. Buckley's paper, many of them had had the opportunity of seeing how his figures compared with their own. Probably many had not kept their records of results as carefully as they were kept at Droylsden, and they admired the way in which they had been presented. According to Mr. Buckley, the average life of the retorts was 1314 days, of which 1250 were days of gas producing. This was rather less than the average life obtained with horizontal settings of retorts. Moreover, Mr. Buckley did not have to let-down his plant to the extent which would have been necessary had he been solely responsible for the gas supply of Droylsden, without being able to fall back upon Manchester to make up the difference between the summer and winter load. He was able to work his plant at continuous capacity, and only shut-down when repairs were necessary. This had a decided effect. At Ormskirk the average life of the retorts since the new horizontal plant commenced work at the end of 1912 had been 1446 days. He had reckoned out, on Mr. Buckley's lines, the cost of maintenance at Ormskirk from August, 1912 to 1923. The plant commenced working in December, 1912. He got for the gas-engine generating electricity 0·330d. per ton upon the total amount of coal carbonized; maintenance of stoking machine, elevator, &c., 3·514d.; maintenance of retorts, 7·38d.; and gas for engine, 1·225d. Mr. Buckley had said he did not include gas; and he quite agreed with this view. So leaving out that item, his total cost for maintenance and repairs was 11·25d., compared with Mr. Buckley's 9·10d. The total amount of coal carbonized over a period of ten years was 73,370 tons. The 7·38d. was made up of £621 for labour in repairs of machinery and plant, and £1639 on actual retort settings. It appeared, therefore, that Mr. Buckley's results were slightly better than those obtained at Ormskirk with horizontals; but he thought the slight advantage of 2d. was fully accounted for by the fact that he had to be constantly letting-down and starting-up his retorts. Had he been able to work continuously, the retorts would have had a much longer life, and the cost of repairs would have been lower. He quite agreed with Mr. Buckley's remarks about selling water with coke. One could not expect to get the same price for coke which was streaming with water as for dry coke. He thought it would be found that between horizontal and vertical coke there was not more than 3 p.ct. difference in the moisture content. From some of his friends who were producing vertical coke he had obtained samples. Where the coke was taken fresh from the retorts, there was a much lower moisture content than when it had been lying in the open for some time. Vertical coke, like horizontal coke, would contain 13 p.ct. moisture when it had been exposed for a considerable time, because of the action of the weather and rain. At Ormskirk, during the ten years, the actual coke sold was 10·7 cwt., as against 9·53 cwt. sold at Droylsden. Assuming that over this period the average cost of coke had been 30s. per ton, they got a total difference in the actual retort of 21·6d. per ton of coal carbonized. In other words, the incidence of cost of residuals and the return obtained from residuals was very much greater than the incidence of the value of the greater yield of gas—say, from 13,000 to 17,000 c.ft. per ton. For the last six months at Ormskirk—he quoted it because it was a small plant—the cost into holder, including all works charges, purification, apportionment of salaries, overhead charges, &c., was 8·5d. If it had not been for the return from residuals which they were able to get from the plant, they would never have obtained so low a figure.

Mr. F. H. ROBINSON (Harrogate) said that Mr. Carr attributed the lower cost of the vertical retort, in comparison with the horizontal retort, to the continuous working of the former. He did not quite agree with Mr. Carr in this view. In his own experience, there was a difference in favour of the vertical plant over the horizontal when both were working under identical conditions.

Mr. BUCKLEY remarked that the figure of 1250 working days was relatively low. He claimed that the average working life of the vertical retort should be 1500 days, and the 1250 was due to the failure of one of the settings which was put in. Droylsden was an experimental station. No. 1 setting was built up of a particular material which lasted remarkably well, and gave over 1500 days. No. 2 setting was built of a different material, which was obviously wholly unsuited for the work for which it was put up; and the result was to bring down the average life to 1250 working days. Later on, when the settings were rebuilt, the average was about 1500 days; but the number of days which a retort worked was not the really important matter. The question was, How much coal was carbonized? It was an undoubted fact that one retort might have 3000 working days, and yet they might get less coal through it than through another the working life of which was 1500 days. He was speaking of retorts which were looked after and kept in good order. Naturally, the period of life depended largely upon the supervision, much more so with verticals than with horizontals. In his opinion it paid. So, with regard to Mr. Carr's figures of 1446 days, he would like to know what weight of coal was carbonized per day. What tonnage did Mr. Carr get through? He did not agree with Mr. Carr that if vertical coke were exposed, even in wet weather, for a number of days, one would get 10, 12, or 14 p.ct. of moisture. A piece of vertical coke might be dropped into a bucket, and left there for half-a-day, and yet they would not get 5 p.ct. of water in it. The texture of vertical coke was such that moisture apparently could not get into the interstices. Such moisture as there was, was purely superficial. Horizontal coke was softer and more friable, water could more easily penetrate, and it was a much easier matter for it to hold a greater percentage. It was evident that Droylsden had done remarkably well. They knew that Mr. Carr's installation at Ormskirk had been well looked after; and as Droylsden was doing even better, they had a right to feel satisfied.

A LIVERPOOL POINT OF VIEW.

Mr. E. ASTBURY (Liverpool) said that, from a Liverpool point of view, the paper was interesting to him, because they had experienced many of the difficulties which Mr. Buckley met. It would appear that Mr. Buckley had been one of the Coal Controller's favoured few in regard to the material which he was able to put through his retorts. Some of the material carbonized in the verticals at Liverpool produced coke—if coke it could be called—which set like concrete; and in order to keep the retort working, it was necessary to have the bottom dealt with every half-hour, resulting in great wear and tear of the settings and retorts. He had taken out their own costs to compare with Mr. Buckley's figures, and they amounted to a little over 2d. per ton more.

There was some difficulty in taking out the figures, because they had horizontal retorts working in conjunction with verticals. All their costs were kept on a costing system, and the figures were taken upon that. It should be mentioned that they included a number of repairs and renewals. There were some clerical errors in the paper which did not detract from its value, but ought to be amended. In the summary of tables at the end, the maintenance and repair of gas-engines was given as 0·390d. per ton of coal carbonized, but, referring to Table III., it appeared that the 0·390d. was worked out per ton of coal and coke. On the basis of per ton of coal carbonized, it should be 0·468d. For the same reason, the figure 0·693d., gas used for coal breaking, elevating, &c., should be altered to 0·779d. These amendments would bring Mr. Buckley's total to 11·043d. He would like Mr. Buckley to tell them what form of lubricant was used, and the washing material for the retorts. Would not it have been better if the figures of the various costs had been given per therm, instead of per ton?

Mr. A. L. Jennings (Cleckheaton) mentioned that at some works breeze was used in the boilers, while at others it was not. In comparing the figures, they wanted to know how much of the coke sold was coke, and how much was breeze. Droylsden used all the breeze, and therefore would sell less coke per ton than if they used coke for the boilers and sold part coke and part breeze.

Mr. W. J. Smith (Bolton) said that Mr. Buckley had given 19·25d. as the cost of gas into holder last year, and 13·06d. as the cost this year. He supposed they might take Mr. Carr's cost at 18·2d. He did not know whether they could have the net cost of coal in these three cases. He certainly felt that, in dealing with the maintenance question, a figure based on coal alone was not quite fair. If it was to be based in that way, there should be given a corresponding figure on the amount of gas, because, after all was said and done, if one was going to work the settings on a 3 million basis, he would naturally have a higher maintenance cost than upon a 2 million basis. With regard to the water in the coke, he was very much in agreement with Mr. Buckley.

Mr. H. R. S. Williams (Altrincham) congratulated Mr. Buckley on the results he had secured. They themselves, working with a De Brouwer machine, used gas to generate electricity, for coal breaking and elevating. They did this at from 105 to 110 c.ft. per ton. It seemed to him that the gas consumption on vertical retorts was rather heavy, though it was not a very serious item.

Mr. Buckley Answers Questions.

Mr. Buckley, replying to Mr. Astbury's question as to the lubricant used, said they employed Stauffer grease. There was a Stauffer box on the main shaft—which was a worm shaft—and they also used that grease on all other bearings on the vertical-retort plant, except, of course, the gas-engine, where they employed gas-engine oil. A man went round on Tuesday morning and Friday morning, and filled the Stauffers with fat. Then during the intervening days the stoker simply gave a small turn. They never had any trouble with sticking shafts, but sometimes, if there was a little pressure in the retort, there was a danger of tar condensing on the worm shaft and getting down into the bearings, where, owing to the heat, it would become somewhat sticky. Where this happened, it was advisable to squeeze in plenty of fat, and so get rid of it. They had never had to do any real patching in the retort, except (say) during the summer time, which was the time of rebuilding. They had on hand a number of old inclined retorts, and were able to cut from these the necessary patches to make up any parts which had become bad. For washing the inside of the retort he generally used tarmac. There was also a material called "podge," which could be employed for small patches. It was a mixture of fireclay and silica, with a little salt put in it. The salt helped to flux it, and it could be filled into little cracks. He had seen places where the erosion due to coke sliding down had been such that the retort itself had thinned, and these bits of "podge" which had been pushed in between the cracks were standing out from the face of the retort. For the purposes of the paper, he had thought it advisable to keep to the cost per ton. As a matter of fact, he could not have given the cost per therm over the whole period, because he had not got the calorific value in the very early days. But in the last of the tables he had worked out the cost per therm. Up to date they had sold 1538 tons of coke, and had produced 42 tons of breeze. Prior to introducing the boiler with the Wilton furnace, they had one of another type, under which they used to burn 14 tons of coke per week, costing at present 30s. per ton. Now they burned 12 tons of breeze, and maintained the steam with ease. He was sorry he could not give Mr. Smith the net cost of coal for this year. After all, one must remember that the managers of the Droylsden works had nothing to do with the purchase of coal or the sale of the residuals. All this was dealt with from headquarters, and the managers were managers pure and simple—responsible only for their works. The gas used for elevating looked rather high; but whether it was high or low, he had stated what had actually happened.

In proposing a vote of thanks to the author, Mr. Brearley said the paper had been both entertaining and instructive. He wanted to refer to one point which was not directly connected with the subject, but was a very striking fact. Mr. Buckley had been able to give them detailed analytical costs of the installation at Droylsden over a period of ten years. They knew from the technical literature which came under their notice that costing was coming very much to the front, and a paper was read at the Eastern Counties Association meeting a little while ago which described a very fine system; but it appeared that Mr. Buckley had anticipated by ten years all these new ideas about costing, and the members should congratulate him heartily.

Mr. E. H. Hudson (Normanton), in seconding the motion, said they knew from experience that when Mr. Buckley came before the members with a paper, there was something worthy to enter in the transactions of the Institution. He was in a better position than the engineers employed by companies, and having such a works as that at Droylsden under his charge, he was able to collect data. Comparison with general working elsewhere might not be altogether fair, but this single flaw in the paper was more than compensated for by the fact that these were figures which had been accurately recorded, and would be of great use for comparative purposes.

The vote of thanks was passed heartily.

The following paper was then read and discussed.

GAS FOR THE HOUSE

WITH SPECIAL REFERENCE TO THE ORGANIZATION OF THE WORK OF PROVIDING A SATISFACTORY SUPPLY OF GAS FOR LIGHTING, COOKING, HEATING, AND VENTILATION, AND THE MAINTENANCE OF CONSUMERS' EQUIPMENT IN SATISFACTORY WORKING ORDER.

By Mr. W. B. M'Lusky, of Halifax.

The purpose of this paper is to elicit the views of the members of the Institution, many of whom have had useful experience in this important work; and if I touch ground that has already been covered, it will, I hope, be understood that I do so merely to provoke discussion.

The time and attention that have been devoted to the maintenance of industrial gas-appliances have been productive of the best results; and it will help us in our discussion of the domestic user's needs if we note in passing that complaints from industrial users are rare. Skilled oversight at the point of ignition, with the assistance of the fitter or executive officer of the gas department, has brought the use of gas for industrial purposes to a high state of efficiency.

Maintenance.

In the domestic field the number of consumers is great, and the revenue per consumer small. Therefore, to overtake the work of maintenance satisfactorily, and at moderate cost per unit of gas consumed, the work must be well organized, and executed by men skilled in their craft. When this is done the results are commensurate with the cost; and in course of time, the increasing business consequent upon good maintenance reduces the incidence of distribution costs per unit of gas supplied. There can be no satisfactory progress in the business of gas supply without maintenance; and where the maintenance service is not thorough, complaints arise which can only be remedied at the expense of a special visit, and at a greater cost per call than properly-organized routine work. Maintenance, moreover, provides an uninterrupted and reliable service, whereas defects not only create dissatisfaction, but temporarily cut off the revenue that would provide the funds necessary for a good maintenance service. Without maintenance many consumers would suffer defective supplies, believing, no doubt, that the source of all the trouble was "that gas." The visit of the maintenance inspector induces the consumer to relate his difficulties; and in most cases the remedy can be applied in a moment. Much goodwill and many opportunities for the sale of gas are lost where there is no maintenance.

Internal Pipes and Fittings.

The cause of complaint in many cases is fundamental—defective internal pipes; but we know that many consumers suffer from defects having their origin in causes beyond the scope of a standard specification relating to internal pipes and fittings. Time could be usefully employed in covering the whole field of distribution, beginning with the capacities—relative to the maximum demand—of the mains, service-pipes, and meters, or the cause—well known to the engineer—of temporary interruptions of supply; but time will not permit, and I beg that you will allow me to assume that all this good engineering work is well in hand, so that we may focus attention on the maintenance of the consumers' equipment. Reference to the standard specification presents me with the opportunity of acknowledging the service rendered to the gas industry of Halifax by the architects, builders, and master fitters, who, without exception, work to the specification of the Corporation with praiseworthy enthusiasm. Verily "enthusiasts soon understand each other."

Systematic Overhaul.

"Science, as well as history, has its past to show;" and we admit that some of the gasfitting work done twenty-five years ago has required overhaul in recent years, mainly at the expense of the owners of the premises, assisted in many cases by the Gas Department. It is all in the way of business. Systematic overhaul of any work done twenty-five years ago may be quite useful. It is good for the gas-works, buildings, plant, and machinery, and also for the distribution system. It is invaluable to the house owner who is determined to keep his property in an attractive let-able condition. The difficulty is that owners of house property are not keenly interested in the renewal of gas-pipes; the inducement to spend money is not so attractive in their case, for the renewal of gas-pipes in the house does not tend to increase the landlord's revenue. On the other hand, the gas undertaking and the consumer derive benefit from any work that ensures the delivery of gas. Good gas in the gasholders does no work; it is the gas we deliver and follow to the point of ignition that serves the consumer and provides the revenue of the undertaking.

The business of gas supply only begins when the burners and appliances have been fixed and passed for service. Intelligent inspection ensures satisfaction at the start; but inspection at regular intervals—preferably eight times a year—by the officer responsible for the district, who incidentally reads the gas-meter and records the consumption of gas for the consumer and for the Accounts Department, is necessary. This inspector detects and reports defects, and supervises the work of effecting a remedy;

he also organizes the seasonal overhaul of appliances, and the routine inspection and maintenance of the consumers' equipment.

THE SATISFACTION OF GOOD SERVICE.

No one grudges the domestic user these services. As I have already shown, they do not in the end increase the cost of distribution. Special calls for the investigation of individual complaints diminish when maintenance is good. Even in our relatively small area (17,544 acres) the amount of time spent on special visits was at one time a serious item. Savings and earnings apart, however, there is added satisfaction in discovering and remedying defects which only the eye of the experienced inspector can detect; and if the inspector does his work well, and gives clear and definite instructions to the maintenance fitter, unnecessary calls, which are a nuisance to the consumer, are avoided. The district inspector should prepare the way for the maintenance fitter who follows with an official introduction to the consumer. There is thus no invasion of the premises, as in the case of the itinerant dealer.

COST OF DISTRIBUTION.

The cost of distribution in Halifax for the last completed year amounted to approximately £27,000. In this item is included:

(1) All new mains, service pipes, and meters.
(2) Repairs and maintenance of mains and service pipes.
(3) Repairs and maintenance of meters.
(4) Meter inspection.
(5) Fittings inspection.
(6) Maintenance of consumers' equipment.
(7) All expenditure on gas-stoves.

The total represents a fraction under 8d. per 1000 c.ft. of gas sold, which corresponds approximately with the net average figure for 43 gas-company undertakings whose accounts are dealt with in the "Gas World" analyses of accounts for the year ending December, 1922.

The details of item (5), which embraces all routine and special visits made to the consumers' premises for the adjustment or repair of lighting burners and non-lighting appliances (time only), are as follows:

Lighting burners—cost per visit, 5·70d.
Non-lighting appliances—cost per visit, 1s. 5·37d.

The effect of this work is reflected in the comparatively small number of complaints now made by consumers direct or reported by the district inspector for attention. The total number of complaints received now averages 3·86 per day in respect of non-lighting appliances, equal to one in every 8000 consumers served. Complaints regarding lighting points amount to less than six per month from the whole area of gas supply.

MAINTENANCE WITH FLAT-FLAME BURNERS.

In former days, when gas lighting depended on flat-flame burners, maintenance was necessary. One of my earliest efforts was associated with the replacement of every flat-flame burner in the area of supply by Bray union jets drilled at an angle suitable to produce a light equal to 21 sperm candles, with a consumption of 3½ c.ft. of gas per hour. The general reduction in gas bills which followed stimulated an interest in gas, and in the value of gas not only for lighting, but for purposes other than lighting; and business developed considerably. There is more need for maintenance to-day; there is more to maintain; there is more need for skilled advice and assistance. The flat flame was exposed, whereas the flame of the incandescent burner is covered; and the ordinary consumer cannot speculate as to what is happening beneath the mantle.

Nothing has helped the consumer of gas for lighting purposes in Halifax so much as the distribution of a standard burner. This burner, which is provided and fixed free, puts into the hand of the maintenance fitter an effective instrument to demonstrate the value of his work, and provides the consumer with a striking example of good lighting. The consumer pays for mantles and glassware; and the business now done in the sale of good burners is considerable, for most people will not be satisfied with an inferior burner when they have a good standard before them. The yearly turn-over in mantles and glass alone is a good revenue-producing business.

The following three points should be borne in mind:

(1) The great majority of householders in towns are dependent upon gas for artificial lighting.
(2) The majority of our consumers depend upon gas for lighting.
(3) The maintenance of gas lighting and lighting burners is therefore imperative.

THE QUESTION OF EXPERIENCE.

We are all agreed that maintenance is right and necessary; but there may be a difference of opinion as to the propriety of including the cost of such work in the price charged for gas. It might be suggested that the gas committee or board of directors in each district of supply should be left to settle this question for themselves; but, with all respect, can this question be settled in any district in which a proper system of control and maintenance has not been tried? If no work has been done there is no local experience.

It might be urged that large users of gas for industrial purposes would object to the concession of free maintenance to the multitude of users of gas for domestic purposes. But large industrial users are householders too! They do not oppose concessions to others; what they want is maintenance to satisfy their needs, and an equitable scale of charges for the gas they use. It may be mentioned in parenthesis here that the sale of gas in parcels, introduced in Perth eighteen years ago, and later in Halifax, meets the case of every industrial user small or great. But gas charges for industrial purposes is another subject.

THE EFFECT OF PRICE.

The price of gas for domestic purposes has, however, an important bearing on the subject under discussion. The domestic user takes a practical interest in the price, and regulates his

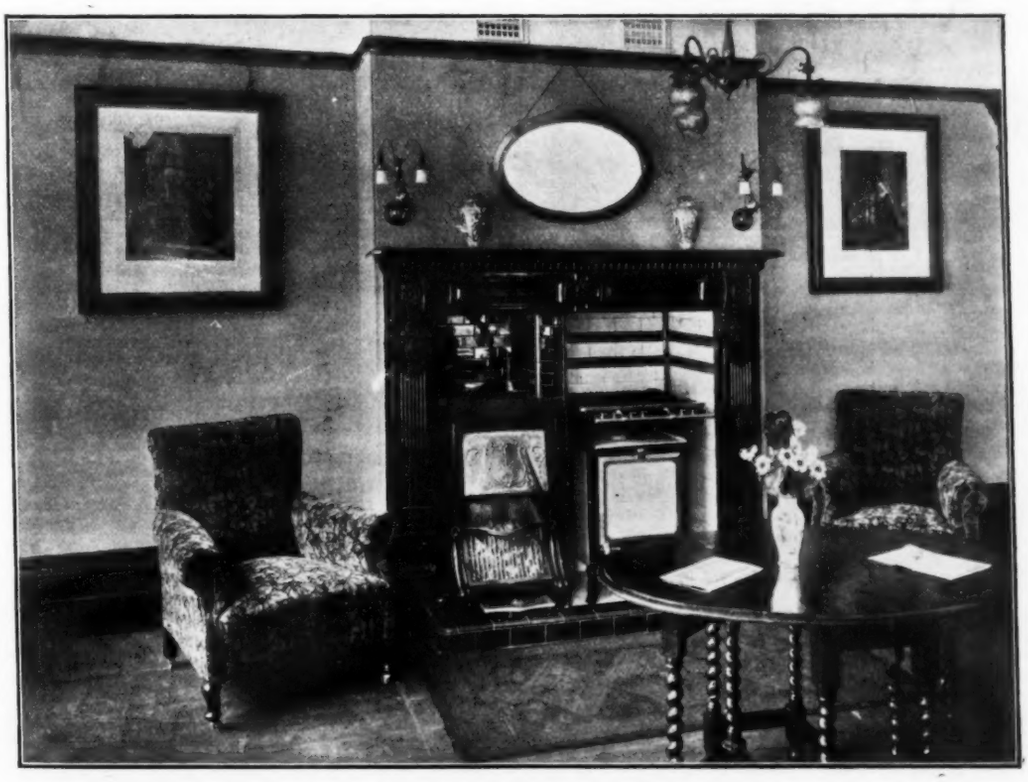


FIG. 1.—A HALIFAX GAS KITCHEN.

demand accordingly. Where the capital charges and other fixed contributions are moderate, the price of gas may be, and often is, sufficiently low to stimulate an increasing demand for gas in the house; but where the price is loaded with high charges for interest, &c., rates, taxes, and contributions towards the relief of local rates, some kind of concession is necessary to enable the consumer to substitute gas for coal on anything like an economic basis. Concessions to domestic users in the Halifax area of supply have resulted in an increased demand for gas. During the past ten years the demand between the hours of 9 a.m. and 2 p.m. on Sundays has increased by over 50 p.ct.; during the same hours on Mondays by 25 p.ct.; and on other days of the week by roundly 20 p.ct. One consumer residing in a house rated at £13 per annum consumed last year 105,000 c.ft. of gas. During the same period, 1272 comparatively small consumers each increased his demand by 1200 c.ft. per month, which increased the annual turnover by 18,000,000 c.ft.

We should not expect such consumers to pay the same price for the last 1000 c.ft. of gas consumed as is charged for the first 1000 c.ft. It is not reasonable to expect a domestic user who draws (for example) 100,000 c.ft. of gas from the mains during the year to contribute ten times as much revenue to the undertaking as a neighbour whose every demand is satisfied with a total consumption of 10,000 c.ft.! We all know the effect upon the revenue, and upon the incidence of fixed charges, of an increased demand per service pipe. We also know that the intermittent user of gas, by limiting his demand, increases the cost of his supply; but that is no reason why a consumer who uses gas in consider-

Fig. 2.—Coke Fire, with Halifax "Tidy."

able volume should be burdened with charges for which he is in no way responsible.

The small consumer in Halifax who uses gas in excess of the normal demand for the premises occupied is, by the operation of the scale of charges for domestic purposes, getting his supply at a price comparable with the industrial rates.

All-Gas Houses.

The number of all-gas houses is increasing; and concessions in price commensurate with the increased consumption will stimulate the sale of gas in dwelling houses. The housewife already appreciates the value and the collateral advantages of gas; and she has discovered the limitations and defects of the ungainly coal-fired kitchen range. The space formerly occupied by this costly means of cooking and heating is now utilized to better advantage.

Photograph No. 1 illustrates a Halifax kitchen in which all the cooking is done by gas. The parlour type of grate, fitted with copper back boiler, heats all the water required for bath and scullery purposes. When the Halifax "tidy" or fuel guard is fitted to the firegrate (see photographs 2, 3, and 4) the fuel is held in a thin layer, and makes a bright fire which meets every demand for general heating and hot-water supply. Coke gives a much better result in this grate than raw coal. When the open fire is not in use, the gas-heated boiler, coupled to the water-heating system, is available as and when required. This arrangement converts a working kitchen into a comfortable sitting-room, and thus virtually adds another room to the house. This is a good scheme for flats.

In houses of the Yorkshire type, with separate scullery, the gas-cooker is fixed in the scullery, beside the gas-copper, which

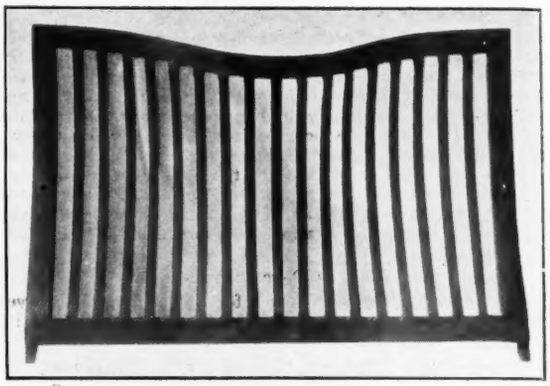


Fig. 3.—The Halifax "Tidy."

has displaced the old-fashioned coal-heated set-pot or "copper," making the scullery a smart place for the cooking of food. This concentration of work in the scullery, made possible by the use of gas for cooking and water-heating, also adds another room to the house, as a gas-fire or slow-combustion grate is installed in the place of the old-fashioned coal-fired oven in the apartment that was formerly the kitchen.

In larger houses, and especially those with cellar premises, one or other of the excellent coke boilers now available is installed in the cellar. In Halifax copper boilers are always used for domestic hot-water supplies; but cast-iron boilers are quite useful for central-heating purposes. There is a considerable demand for broken coke for the firing of these boilers; but there is a growing demand for gas-heated boilers for the same purpose.

Hot-Water Supply.

In industrial towns the value of an ever-ready hot-water supply is greatly appreciated; and a gas-heated supply is recognized as the most reliable supply at short notice. The back boiler already described meets the needs of the small house, and is economical under the watchful eye of a careful housewife. In larger houses, however, the amount of coal wasted, in many cases, in the attempt to maintain the temperature of the water in a cylinder of sixty or more gallons capacity accounts for fully 50 p.ct. of the coal bill; and unless special care is exercised in stoking, the temperature of the water is not maintained when two or three operations closely follow each other. If scalding-hot water is required, the bathroom must wait until the scullery is served. The cost of hot water is prohibitive in such cases. The gas-geyser and the gas-heated boiler cut out this continuous expense on solid fuel, and provide every gallon of scalding-hot water required at short notice and at moderate cost.

Ventilation.

Attention is specially directed to the ventilators shown above the picture moulding in photograph No. 1. These outlets are connected to a properly constructed ventilating shaft. The tests we have taken from time to time in Halifax confirm the experience of others—that ventilation is dependent almost entirely upon

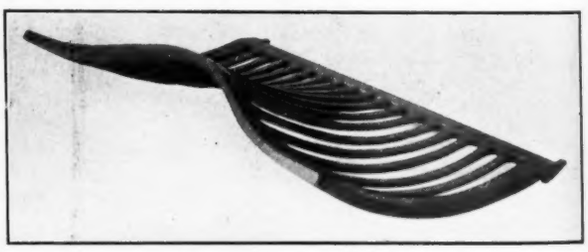


Fig. 4.—Another View of the "Tidy."

chimney pull, that the chimney is overworked, and that chimneys do not always function. The following example is typical.

Fresh-air inlet—Two windows.		
Area of each opening 150 sq. in.		300 sq. in.
Sash ventilators—Two in number.		
Area of each 42 sq. in.		84 ,,
Total area of fresh air inlets.		384 sq. in.
Outlets—		
Chimney flue	81 sq. in.	
Ventilator	7 ,,	
Total area of outlets		88 sq. in.
Air capacity of room		3825 c.ft.
Discharge of air from room, per hour		3470 ,,

It will be observed that the air-change per hour in this case is less than one movement of the total content.

The officers of gas undertakings will render a service to their fellow citizens if they will direct the attention of those responsible for the building of houses to the elementary principles of ventilation. Medical officers and architects generally will heartily support every effort of this kind and will appreciate the value of gas flames in promoting the movement of air in rooms. There can be no doubt that, when the value of gas as a ventilating agent is better understood, the demand for gas lighting will be greatly increased. In my own experience recently, gas has been installed for this express purpose, not because the form of lighting displaced was unsatisfactory, but because the air of the rooms was stagnant. Hitherto the value of gas lighting in promoting natural ventilation has not been duly emphasized when other forms of lighting have been pressed upon the notice of the consumer.

CONCLUSION.

The question arises now and again: How far may we proceed with work beyond the meter outlet? What are our powers? The answer is: Good legislation and wise administration will accomplish anything that is good for the consumer. What is not forbidden may be done.

The gas undertaking of Halifax preserves a free hand to work for any consumer, but as a rule limits its enterprise in the way of internal gas lighting to the fixing of a specimen fitting or model installation, thereby satisfying the consumer and demonstrating the value of gas. There is on the average one master fitter to every 300 gas consumers in the town. If the master fitter devotes himself to the consumers in his district, he will build up a nice little business. If he neglects this opportunity, the consumers will come to the gas department, who will probably hold them. The only vested interest in the business of gas supply is the common interest of the consumer, the gas supplier, and the gasfitting trade. That interest is to be best developed by the co-operation of all three parties. The duty of the gas undertaking is to co-operate with the master fitter, and see that his stock is replenished from time to time—from the gas department stores, if necessary. The district master fitter's window display is seen by consumers in that district practically every day; and if it is a good display, and represents the latest and best in gas-appliances, it will attract notice and stimulate trade.

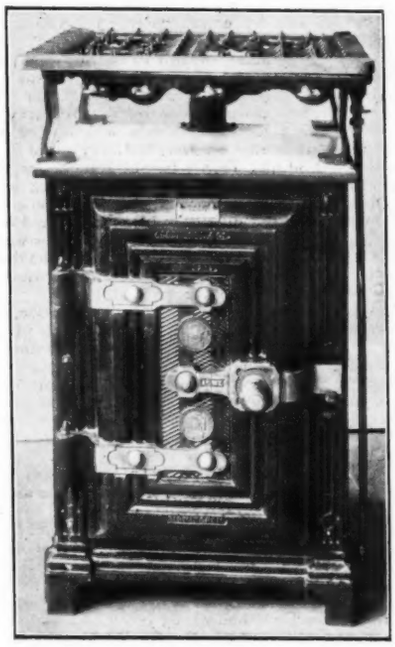


Fig. 5.—Re-conditioned Cooker in use in Halifax.

Under existing conditions nothing is so good for the consumer as the combined efforts of the gas supplier and the gasfitting trade. There is room for both, and there is work for every competent operative fitter. In the course of his general duties the master fitter has many opportunities to detect and report faults in consumers' fittings and appliances; and when business arises as the result of his investigations, it should be the duty of the gas department to assist him to make a good job. In Halifax all work of this kind is established on a proper business footing by formal agreement. The master fitter, realizing that the science and practice of gas supply is not static, is more and more disposed to keep himself informed as to every new development, and readily accepts the services of the gas department in the preparation of specifications, schedules of quantities, and estimates for renewals, extensions, or new work.

A proper system of maintenance not only ensures the maintenance of the existing equipment, but stimulates a desire for something better. Consumers generally are satisfied if the appliance in use will do the work required; but that is not enough. We must encourage satisfied consumers to visit the showrooms and select appliances that will meet their demands more efficiently as to time occupied and gas consumed for a given operation. Maintenance on these lines begets goodwill and an increasing demand for gas.

Discussion.

The PRESIDENT said the question Mr. M'Lusky had placed before them was a very important one. As President, he had been anxious to secure a paper on the maintenance and inspection of burners and gas-appliances, because it was a matter of supreme importance at the present time; and they were much indebted to Mr. M'Lusky for giving them the results of his experience at Halifax. He had made the point that to know how to bring gas into the holder was of no use unless they could promote the business of distributing. It was necessary that they should use every endeavour to retain the business they now had, and to extend it further. In order to do this, the customer must be looked after in the best possible way; and this could only be done through systematic inspection, and also maintenance of the apparatus. Coming to the paper itself, he saw that very early the author mentioned defective internal pipes. However good inspection might be, it did not always reveal the defects—particularly hidden defects—and the inspector going round one day might think that everything was right, and yet the next day there might be a serious escape causing trouble. He did not know that this sort of thing could be entirely avoided, but the whole question was a difficult one to deal with. They had really no power to inspect fittings, but in ninety-nine cases out of a hundred they could, of course, inspect if they liked. Then there was the question of liability. If they undertook systematic inspection, it tended to place upon them the responsibility of seeing that everything was in order, but they could not take responsibility for hidden defects that might have been there for years. He agreed with Mr. M'Lusky that the owners of house property were not keenly interested in the subject of gas-pipes. In Liverpool they found the landlords particularly were very difficult to deal with sometimes, when it was sought to charge them for the renewal of a service plant. If this kind of work were done free, it would ease matters very considerably. He congratulated Mr. M'Lusky on the small number of complaints in Halifax. It was an indication that the system of maintenance was effective, and that the work was done at a reasonable cost. It was questionable whether such work really cost anything, because systematic maintenance would no doubt increase sales, and increased sales meant a saving on the standing charges. It would be very interesting to see the standard burner which was being fixed free. They all knew that Halifax was a pioneer on the question of "Standard Requirement" payment. In the current "JOURNAL" [p. 271] there was an account of what Halifax was doing in the way of charging on the basis of standard requirements. It was a very interesting system, and no doubt a great deal could be said for it. He was rather disappointed that they had not been given more details of the organization of the maintenance department, and some further information would be interesting.

GOOD AND BAD JOINTS.

Mr. W. BUCKLEY said he must congratulate Mr. M'Lusky on the happy relations which existed between himself and the plumbers; it was a pity this did not hold good everywhere. It was stated in the paper that some of the gasfitting work done 25 years ago had required overhaul in recent years. He (Mr. Buckley) had brought to the meeting some specimens of joints which had been cut out from Manchester services. They were supposed to have been made by authorized plumbers, and had been cut from places where the people had been complaining about bad gas. He was not a plumber, but could certainly have made a better joint. He had also brought with him some examples of the type of joint which should be put in. An interesting one, which might be of use to the members, was a lip joint cut at an angle, instead of being square. It was extremely useful when connecting-up from a meter to (say) a gas-fire in a sitting-room. One sentence in the paper should be printed in letters of gold, and put up in the rooms frequented by maintenance men. "Good gas in the gasholder does no work; it is the gas we deliver and follow to the point of ignition that serves the customer and provides the revenue of the undertaking." This was very excellent. He would like to ask Mr. M'Lusky whether he had a special staff of inspectors, or were they ordinary meter inspectors trained to do this particular work? Apparently they were to inspect eight times a year—at any rate, Mr. M'Lusky suggested this. His attention was attracted by this paragraph: "One of my earliest efforts was associated with the replacement of every flat-flame burner in the area of supply by Bray union jets drilled to an angle suitable to produce a light equal to 21 sperm candles, with a consumption of 3½ c.ft. per hour." This was a pretty high figure for flat-flame burners. Ordinarily they used to burn the gas at a standard rate of 5 c.ft. per hour; and if they got 20 candles it was 4 candles per foot. In the old days, this was looked upon as a very good value for a flat-flame burner. Another feature of the scheme which he thought was excellent was that the consumer was provided with a free burner, and it was also fixed. Mantles and glass were charged for. Did Mr. M'Lusky find that his profit upon the mantle and gas covered the cost of the burner, or did the introduction of this good burner into a house or shop induce the consumer to buy more burners of the same type, and thus lead to a profit being made upon the sales of the burners, which covered the cost of the free burner? It seemed to be good business. Unfortunately, many gasfitters had a habit of buying cheap, shoddy goods, and when these were used in the houses they brought gas into disrepute. It was unfortunate that most of the showrooms were closed at night; and he would suggest that, when somebody complained of bad lighting, he should be told: "We will provide you with some burners both inside and outside, and also give you the gas, if you will allow us to put on those burners what it is costing to light the whole of your place." Personally he thought this would be a paying proposition, because one got a cheap advertisement, and did not need any staff for it beyond the maintenance staff who kept the burners in good order. It seemed to him that an effort in this direction would do more to popularize gas than the large showrooms many undertakings had.

XUM

An Excellent Sign of the Times.

Mr. J. H. Brearley (Southport) said that whether or not they agreed with Mr. M'Lusky entirely, they were bound to say it was an excellent sign of the times that, among municipal undertakings, there was much greater interest taken in the consumer's welfare than was the case not very long ago. Those who were in charge of local authority concerns would be the first to admit that those undertakings had lagged somewhat behind companies in their readiness to take a hand in helping consumers to get the best results. Not very long ago the gas engineer, even if he had the best will in the world, was cribbed, cabined, and confined, lest in unduly pushing his own undertaking he should adversely affect the electricity works; while, on the other hand, the electricity undertaking was permitted to run riot among the gas consumers in its efforts to build up a respectable business. Publicity had done much to alter this state of affairs, and the "B.C.G.A." had been a great factor in this publicity. To-day it could be truly said that the Halifax gas undertaking did not lag behind, but actually took the van in its efforts to extend the uses of gas by promoting a sense of contentment among consumers of all classes. This knotty point, the private gasfitter or plumber, seemed to have been happily surmounted. As one who many years ago discovered that it was much better to make friends of these people than to attack them, he heartily supported the policy of mutual arrangement, the best form of which each one could find out for himself. Mr. M'Lusky had stated that maintenance of consumers' burners and appliances did not increase the cost of distribution. This was true if the long view were taken—namely, what gas consumption is retained, and what is added to the present output by a judicious system of maintenance. But eliminating gas consumption, it was quite likely that some cost would be incurred, and especially if one was prepared to go to the extent of supplying free materials as well as labour. It all depended upon how far one was prepared to go in maintenance. With regard to the standard burner supplied free, was more than one burner supplied to one consumer, or was it merely that one burner was supplied free as a sort of specimen, and if more were required they must be paid for? As one who had taken a little interest in ventilation, he was attracted by the example given. What surprised him in this was the small discharge of air from the room. Sufficient details were not given to show whether they could really accept the result as typical. Where was the discharge measured, and by what means? If by an anemometer, was it carefully checked against a standard instrument before the tests were taken? These instruments were apt to give wrong results unless periodically examined. If the discharge was ascertained by chemical analysis, how were the samples taken, and by what means were they tested? Of course, with chimneys it was just as important that there should be adequate fresh air inlets as outlets. If air could not get in without a struggle, it could not get out without a struggle. Moreover, they were not told whether the test was with a fire burning or not. If with a fire, they had no details as to the heat units sent up the chimney to aid in the ventilation. He quite agreed that the attention of those who built houses should be directed to the elementary principles of ventilation, but was not quite sure where the elementary principles left off and the complex principles began. Ventilation was a very intricate science, depending upon a great number of factors. But one thing was certain—the gas flame could be made a useful adjunct to ventilation by providing air outlets at or near the ceiling. It must be ensured that they were outlets and not inlets, for it did not necessarily follow that because a grid was placed at an upper point in a room it would necessarily become an outlet. For this reason, it was always better to put such an arrangement into a chimney or other ventilating shaft. He took the opportunity of congratulating Mr. M'Lusky upon not merely attending to consumer's maintenance, but also so shaping the gas charges that they had every inducement to burn plenty of gas, and that to the consumer's advantage. A flat rate of 2s. above a pre-determined quantity was a great allurement; and he anticipated that when it came into force there would be a further substantial increase in output for domestic uses in Halifax.

Mr. Harold Davies (Chesterfield) said it would be interesting for the members to know what Mr. M'Lusky did for the consumer from the main to the burner, what he charged for, and what he supplied free. They were under a statutory obligation, he believed, to supply a certain portion of the service pipe free of charge, if the consumer asked for it; but he did not think they were all sticking to that as a hard-and-fast rule. Some undertakings made a charge for the fixing of meters, others charged rent. He was under the impression that Mr. M'Lusky did not. These were points which interested the consumer in the early stages when deciding whether to use gas or electricity. The next point was whether Mr. M'Lusky did anything in the way of piping houses for consumers. During the next few years a huge housing problem would have to be solved, and in Chesterfield, at any rate, he could say, from the report of the Surveyor, that building for household purposes had never been so busy as it was at present. This sort of thing had got to come throughout the whole of the country. Now in these things the members must take some interest. What were they going to do to see that gas was installed in every house? He noticed that Mr. M'Lusky gave a burner free to each house. He himself did the same thing, but went a little further, because he gave them a burner complete with glass and mantle. They supplied service pipes from a public highway to a distance of 20 ft. More than this, they fixed meters free of charge, and supplied four points. They supplied a point for a cooker. They also maintained burners for a charge of 6d. per visit. It would be interesting to know what system of maintenance with regard to burners Mr. M'Lusky had. The particular kitchen shown in the paper was quite beyond his experience, and he would be interested to hear what was the cost of the fittings—such as a grate for the use of coke—and whether in the particular circumstances, or in any circumstances, it was a satisfactory method of using coke.

Cost of Distribution.

Mr. E. H. Hudson (Normanton) called attention to the statement that the cost of distribution represented a fraction under 8d. per 1000 c.ft., corresponding approximately to the net average figure for 43 company undertakings whose accounts were dealt with in the "Gas World" analyses of accounts for the year ended Dec., 1922. How did Mr. M'Lusky get that? He had tried to work out the figure in various ways, and had failed. Taking the items as they stood in their own case, he thought the cost was 5·8d.

Mr. G. W. Tooley (Manchester) said that seven or eight years ago, at Barnsley, he took part in the discussion of a paper given by Mr. F. D. Richmond, who was then the Engineer at Heckmondwike. He hazarded a remark which was objected to by many of those present, and which also brought him under the "editorial lash" of the "Gas Journal." The remark he made was that in his opinion gas for lighting purposes was practically at a standstill, and in order to stimulate the use of gas it would be necessary to concentrate their energies in promoting the use of it for heating and cooking. He was rather pleased a few days ago to find that this opinion was, to a certain extent, confirmed by the eminent Chairman of a gas undertaking who, in discussing the relative merits of electricity and gas, said that for indoor lighting, electricity would hold its own, but for cooking and heating purposes it was nowhere. This statement was confirmed by the experience of Manchester. During the last ten years the increase in the number of consumers was 5·5 p.ct., and the increase in gas sold was 9 p.ct. On the face of it, one would be inclined to think the 9 p.ct. increase showed that gas was holding its own for lighting purposes; but they had to take into consideration that the number of gas-cookers had risen in those ten years from 65,000 to 121,000, and the gas-fires from 6700 to 42,000. It was plain that the bulk of the increase in consumption was due to gas for heating or cooking. During the discussion on that paper at Barnsley, he suggested that, in order to stimulate the use of gas, it might be advisable to get the fair average consumption of the various sizes of meters, to fix a certain standard, and then to say to the consumer: "For all gas that is consumed beyond that standard, you shall have a reduced price." Mr. M'Lusky had gone much on those lines, though in another direction. It was quite obvious that, with the present price of gas, consumers could not be expected to discard coal fires in favour of gas-fires. Until something was done on the lines suggested by Mr. M'Lusky, they would never be able to attain the great ideals which were aimed at by the Smoke Abatement Committee. Mr. M'Lusky's cost of distribution was something under 8d. per 1000 c.ft. In Manchester, at March 31 last year, the cost of distribution for the whole year was 5·3d. per 1000 c.ft. Of course, they had not sent the maintenance men round. It appeared to him that the difference between 5d. and 8d. would be prohibitive as far as Manchester was concerned. They were not going to stimulate the use of gas by increasing the cost. The members had reason to be grateful to Mr. M'Lusky for bringing forward this paper, which was most lucid and instructive.

Mr. J. H. Clegg (Burnley) said, irrespective of price, most people who could afford electricity for lighting would prefer it for various reasons; but by judicious efforts on their part the consumption of gas could be increased. He thought it would be advisable to reduce the cost, and in that way promote the sale. With regard to the question of ventilation, they were not concerned so much with getting air into a room. It could get in through cracks in window frames and doors, and in other ways. But the problem was to deal with the air heated by the gas.

Mr. R. H. Ginman (Leek) said that at Leek they were now sending out more gas than they ever did before. For the seven months ending October, they sent out 75 million c.ft.—40 millions in the day, and 35 millions at night between 6 p.m. and 6 a.m. He had been wondering what would be the effect of instituting charges on the lines suggested by the author. They had not a very big industrial load. There was a population of 17,500, which, on an average of five persons to each house, gave 3500 houses. The electricity undertaking, with which he was partially associated, had an 85 p.ct. load factor for power-load and 15 p.ct. for the lighting load. He considered they were competing fairly well with electricity at 2d. per unit for power and 5d. per unit for lighting. The average charge for gas was 3s. 6d. per 1000 c.ft. He was rather delighted with the Halifax gas kitchen Mr. M'Lusky had shown them, and one could only admire the artistic effect; but whether efficiency was combined with economy was another matter. He liked the three universal burners and the V.C.M mantles, but did not regard this as efficiency with economy. At the same time, he did appreciate that the theme of the paper was efficiency of distribution service with economy.

Standard Quality and Maintenance.

Mr. H. Kendrick (Manchester) said that at Stretford, some fourteen years ago, he introduced a maintenance scheme which he described in a paper before the Institution about nine years since; and what he said then stood to-day. The point he wanted to make at the present moment was that a maintenance scheme was of no use whatever unless the gas was kept at a standard quality. No useful purpose was served by sending out a gas of 400 B.Th.U. one week, and then a gas of 500 B.Th.U. a few days later. This would upset any maintenance scheme. Then, to secure the proper efficiency of the burners and apparatus, it was important that the percentage of carburetted water gas put into the mixture should be constant. In fact, he would say that for the proper efficiency of gas-consuming devices it was more important to have a constant percentage of carburetted water gas, within certain limits, than to have a constant heating value, because of the great difference in the air volume required for complete combustion. This point appeared to have been lost sight of, and was worth calling attention to. Mr. M'Lusky had gone much further than he himself went at Stretford; but during the last three years he was there, everything of course was at a standstill, and alterations could not be carried out which would have brought it very much nearer to Mr. M'Lusky's system.

Mr. M'Lusky Replies.

Mr. M'Lusky said the President had referred to the question of liability. By getting the customers to sign a form, they could dissociate themselves entirely from liability in respect to accidents. In Halifax, where there was a garden on private property, they went 20 ft. inside. Meters were fixed free of charge, and a pre-war rent was charged. The standard burner was made to their order, and was on

sale to consumers. It was a small No. 2 burner, quite as good as they wanted. Mr. Buckley had given examples of what passed for workmanship in gas-pipes, and he (the speaker) entirely agreed with what had been said on this subject. The inspectors at Halifax had been in training for ten years. When they started the scheme ten years ago, there was no thought of discharging men who had served the Corporation faithfully for many years; they were put into training, and required to do the best they could, and paid according to their capacity and the work done. The man with a training certificate, who had been trained in the shop, and was able to do a large proportion of the work, had the wage status of a foreman; less competent men had a standard wage in another category. They were all making low-grade gas in these days, whether it was 400 or 500 B.Th.U. If anyone was thinking of high-grade gas, he advised him to read again what was said in the paper. There was no advantage in making 500 B.Th.U. gas. Mr. Buckley's idea of lighting a shop in the evening for advertising purposes was an excellent one. He had given some statistics in the paper, but really it was only a summary of the work done by the undertaking. The free burner was given as a sample, and on the average the consumer bought three or four "on his own." He did not think it was bad business. The ventilating tests were taken with freshly carburetted water gas, and he did not take them himself. He could take them to houses in Halifax where the arrangement was so effective that air could not get in unless the window or door was opened. As to Mr. Davies' remarks, and the accounts of the 43 undertakings, he had assumed that they were making good gas. His own figure of a fraction under 8d. per 1000 c.ft. included nearly 3d. for new meters, &c.

Mr. Davies: In the "Gas World" analysis, they are all revenue items.

Mr. M'Lusky replied that he knew what they included, and also what his own included. He had analyzed the accounts of gas companies, and they knew how to put in what they wanted. In Halifax they got meters out of revenue, and also retorts. Mr. Tooley, who was very complimentary in his remarks, suggested that in Manchester they were working on the same lines, though in different directions. Well, he was not going to criticize Manchester; it would be presumptuous for a man from Halifax to do that. But Mr. Tooley would know now that the cost of distribution in Halifax was not more than in Manchester. The gas kitchen which had been spoken of was designed by a man they got from Liverpool (Mr. Heathcote), and it reflected great credit upon Liverpool. It had been installed in several houses in Halifax, and had done well. The members could have no idea of the smartness of the houses. So in Halifax they were doing something to put gas in its proper place. Why not put it on a pedestal for once? There was a great difference between selling gas without maintaining a good service, and following it up and seeing what one was doing. Twenty years ago he said it was worth 6d., and he had demonstrated that it was. The difference between a well-managed service and a service which was not maintained was worth more than 6d. per 1000 c.ft. What would they have done if they had not tried to make a start? A friend of his had said that gas had to fight for its existence, and there could be no question that it was time to do something to check the influence of electricity enterprise, selling very often under cost price. In Halifax during the war period the great increase in the demand for power brought down the proportion of the lighting demand; but to-day the balance was being restored. The members would be interested to know that in the best-managed and most progressive electricity undertakings the average receipts amounted to 33s. per head of the population. If gas engineers would set about increasing their own business, they ought to do better than the electrical undertakings. They were all agreed that gas should be of uniform quality. There had been difficulties in the past, but he did not think it could be charged against any gas undertaking to-day that the gas was not uniform in quality.

The President said he was sure they all wished to thank Mr. M'Lusky for his interesting paper.

Mr. C. S. Shapley (Leeds) moved, and Mr. R. Watson (Doncaster) seconded, a vote of thanks to Mr. M'Lusky. Mr. Shapley said the author was proceeding on right lines, which all interested in the gas industry would do well to follow. A regular quality of gas was one of the essentials of success. In Leeds, the Gas Committee had succeeded in retaining 73 schools for gas lighting, against the advocates of electricity. He did not agree that gas manufacturers could not prevent the inroads of electricity. He thought they could, but they must be up and doing; and Mr. M'Lusky had shown them one way.

Election of Officers.

Officers for the ensuing year were elected as follows:

President.—Mr. W. B. Frith, of Runcorn.
Vice-Presidents.—Mr. F. Robinson, of Harrogate, and Mr. C. S. Shapley, of Leeds.
Hon. Treasurer.—Mr. T. B. Ball, of Rochdale.
Hon. Secretary.—Mr. W. Rogerson, of Middleton.
Committee Members.—Mr. W. J. Smith, of Bolton, Mr. F. V. Barnes, of Todmorden, and Mr. J. Bridge, of Elland.
Auditors.—Mr. W. Hill, of Stalybridge, and Mr. F. Elliott, of Leyland.

Held Over.—We regret that press of matter for this issue compels the holding-over until next Wednesday of the address of Mr. W. B. M'Lusky to the Yorkshire Junior Gas Association, and the discussion thereon; as well as the Presidential Address of Mr. Walter Grogono to the London and Southern District Junior Gas Association, and the other business at that meeting.

Chemical Engineering Group.—A meeting of the Chemical Engineering Group of the Society of Chemical Industry will be held at the Chemical Industry Club, No. 2, Whitehall Court, London, S.W., on Friday, Nov. 16, when Prof. J. W. Hinchley will read a paper entitled "A New Source of Potash, and its Industrial Exploitation."

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

Visit to the Albion Colliery.

On Saturday, Oct. 20, the Association held their third meeting of the session. On this occasion, a visit was made to the Albion Colliery, Cilfynydd, on the invitation of the Albion Colliery Company. Fifty members were received by Mr. H. H. Evans, Colliery Agent, who explained the general workings of the pit, and afterwards invited those present to make the descent under the guidance of the Manager of the mine (Mr. Williams). The party afterwards viewed the power house and the winding drum. The total output of coal averages 11,000 tons per week.

Following the inspection, the members were entertained at tea, and the President (Mr. T. A. Canning) proposed a vote of thanks to the Colliery Company and to Mr. Evans for their kindness. This was seconded by Mr. T. B. Armitage (Swansea), who stated that the visit had been most interesting, and certainly instructive, for coal was the prime commodity of their business. Mr. B. J. Bell (Hon. Secretary) stated that the Association were indebted to such men as Mr. Evans for the willingness with which requests for visits were granted. He was sure that every member who had visited the colliery would be proud to belong to an industry which held conservation of coal as one of its main endeavours. The coal and gas industries were closely allied; and they had gained an insight into the winning of the raw material. Mr. V. H. Dodgson (Junior Vice-President) associated himself with the previous speakers' remarks, and said it gave him great pleasure to support the motion. Mr. Evans, who, on rising to reply, was received with great enthusiasm, said he was pleased to receive the good wishes of the Association.

Later, the members assembled at the Council Chamber, Pontypridd, where a debate was held; the subject being "Why Electricity?" Following this, Mr. T. A. Canning stated that there was one duty he had to perform. They had with them Mr. David Muir, Engineer and Manager of the Pontypridd gas undertaking, who had been instrumental in arranging the meeting and the visit to the colliery. He thought that they could regard Mr. Muir as one of their best friends, for nothing was too much trouble for him in the interest of the Association. On behalf of the Association, he expressed their sincere thanks. Mr. Muir, in reply, said he had been very interested in the proceedings. He assured them that he would at any time be pleased to be of service to them.

Will.—Mr. George Winstanley, of Messrs. Winstanley & Co., King's Norton, who died in May, aged 80 years, left £51,248 (net £15,318).

Institution of Mining Engineers.—The 34th annual general meeting of the Institution will be held in the rooms of the Geological Society, Burlington House, Piccadilly, on Thursday, Nov. 29. An agenda-programme will be sent to members in due course.

Society of British Gas Industries.—We learn from the Secretary (Mr. Arthur L. Griffith) that the autumn general meeting will be held at the Holborn Restaurant on Thursday, Nov. 8. There will be a luncheon at 1.15, and at 2.30 the general business meeting will be held. At this, a short account of the Society's work during the past six months will be given by the Chairman of the Council (Mr. Frederick C. Tilley, M.I.Mech.E.). He will also contribute a paper entitled "The Society of British Gas Industries: Its Past and Its Programme." This will be followed by a discussion.

Institution of Chemical Engineers.—A meeting of the Institution of Chemical Engineers will be held at the Engineers' Club, Coventry Street, London, W., on Wednesday, Nov. 14, at 7.30, when the following two papers will be read and discussed: (1) "A Study of the Conditions of Constant Rate of Flow in Filter Presses," by Messrs. M. B. Donald and R. D. Hunneman. (2) "A Study of the Absorption Tower," by Messrs. M. B. Donald and C. W. Tyson. The meeting will be preceded by a dinner, at 6.30, tickets for which can be obtained from the Hon. Secretary at the offices of the Institution, No. 307, Abbey House, Victoria Street, Westminster, S.W.1.

Small Size Horizontal Ovens.—Unusual features are to be found in a carbonizing plant which the Russell Engineering Company, of St. Louis, have designed, and are now erecting, for the Quincy (Ill.) Gas, Electric, and Heating Company. One interesting point about it is the very small size of the fifteen horizontal ovens, which are only 12 in. wide, 8 ft. 5⅜ in. high inside, and 13 ft. 3 in. long over all, and are designed to carbonize 4000 lbs. of coal in twelve hours, with a minimum labour cost. Another feature is that the ovens will be heated by producer gas generated in a separate outside producer, using Illinois steam coal as fuel. This plant displaces a battery of stop-end benches of sixes, and in order to continue giving service the new plant must be built in two stages. Other factors that demanded consideration were the utilizing of an existing coal storage shed and coke screening plant, by installing modern equipment to recover the coal from storage and to deliver the oven coke to the coke tower economically; also the supplying in larger quantities of a better grade of coke for a market already developed and capable of further expansion. A detailed description of the plant is given in this year's report of the Carbonization Committee of the American Gas Association.

HINCKLEY GAS UNDERTAKING.

Inspection of the New Woodall-Duckham Vertical Retorts.

To celebrate the completion of the new plant—some illustrated particulars of which were given on pp. 194-5 of the "JOURNAL" for Oct. 17—installed at the Hinckley Gas-Works, at a cost of over £30,000, there was a luncheon in the Union Hotel, last Wednesday. Those attending included the majority of the members and officials of the Hinckley Urban District Council, a number of gas engineers from various parts of the country, and Sir Arthur Duckham. Mr. W. H. BOTT, J.P., C.C. (the Chairman of the Gas Committee), presided.

The toast of "The Hinckley Gas Undertaking" was proposed by Mr. HUBERT POOLEY (Leicester), who said the remarkable figures relating to the gas unaccounted for were an indication of how the works were conducted. With an average of 1·8 p.ct. for the last twenty years, Mr. F. Lee (the Gas Manager) had created a record; and the amount annually saved to the undertaking by Mr. Lee's foresight in this respect would not fall far short of £2500. The result had been to provide gas for consumers during difficult times at a wonderfully low figure. One of the reasons had been that Mr. Lee had held huge stocks of coal. He thought the community at Hinckley had cause to congratulate themselves upon having the works carried on with such success during the trying times that had been experienced. The new plant, he ventured to suggest, would enable the undertaking to maintain its growth against all competition.

Replying, Mr. BOTT said Hinckley people were proud of their gas undertaking, and prouder still of their Manager. The works under Mr. Lee's management had progressed very considerably. Hinckley was only a small town, and they did think it "a feather in their cap" to be able to sell gas during the period of high costs at a lower rate than any other concern in the neighbourhood. Turning back, he said the works were acquired under the Hinckley Local Board Gas Act of 1889. The gas sold in 1882 was 15,847,000 c.ft., and there were 573 meters in use. Steady progress was made, and in 1898 it became necessary to enlarge the works. This was done, bringing the capacity up to 500,000 c.ft. per day. Since then the success of the works had been extraordinary, and the Committee had felt for some years that there must be extensions to ensure a satisfactory supply of gas. By 1914 it was practically decided to instal vertical retorts, but the war came and put a stop to this. In 1919, to help out, a small water-gas plant was procured, which proved of great service. Eventually, after much thought and many visits to other works, it was determined to put-down vertical retorts. During the past 25 years, the consumption of gas had increased from 43,864,000 c.ft. to 143,111,400 c.ft.; and the number of meters now in use was 2207. For many years they had been able to sell gas at a cheap rate; and the prices to-day were 3s. 8d. per 1000 c.ft. net, and 3s. 1d. net for power. In 1914 Hinckley prices were 2s. 6d. for lighting and 1s. 7d. for power. The highest price they charged during the period of high costs was 4s. 2d. per 1000 c.ft. net. The Council felt that this was a position they might well be proud of, and acknowledged that it had been brought about by the untiring efforts of Mr. Lee, whose one object in life seemed to be to do everything possible to ensure the success of the works.

The toast of "The Contractors" (the Woodall-Duckham Vertical Retort Company) was proposed by Mr. J. BENNETT, J.P., who said the Company had made a splendid job of the new installation, and had not spared any expense in giving the works the best possible value for money. They now had electricity in the town, but he thought it was not to be compared with gas for cheapness.

Sir ARTHUR DUCKHAM, K.C.B., responding, said he felt exceedingly proud that his firm had been fortunate enough to secure the contract for the erection of the new retorts. At Hinckley they had an old-established undertaking which had been showing a profit all the way along, and had gone through the trials of the war period in gratifying style. The position of the contractors of gas-plant was to-day very different from what it was some ten or fifteen years ago. The engineer at that time sat down in his office and designed his plant, and sent the design to the contractors. To-day the engineer knew what he wanted; but the feeling between him and the contractor was such that the latter sent in his specified design, and was received on a level with the engineering expert. Co-operation in this respect led to better design, better workmanship, and better carrying through of the job. In the new plant at Hinckley every attention had been given to detail, and it would be possible for the engineer to make a full examination of the plant in ten minutes each day. They had endeavoured to give the engineer the opportunity of keeping his hand on the pulse of his machinery, to see that it was working properly. He complimented Mr. Lee on his excellent management of the works.

Mr. G. CHOLERTON proposed "Our Visitors," and added his tribute to Mr. Lee's management of the works. The toast was responded to by Major PAGET, M.P., who said he had been struck with the personality of Sir Arthur Duckham, representing the old spirit of English industry—pride in one's work for work's sake—and the old and great guild feeling which had been responsible for such friendliness between master and man. He congratulated the undertaking on its splendid management—particularly on its Engineer. They had set a great example of enterprise, efficiency, and self-sacrifice, which had contributed largely to the prosperity of the town. Alderman KINTON remarked that they were all proud of the success the works had achieved.

The visitors were afterwards taken for an inspection of the new plant, which was followed by a visit to the gas exhibition at the Baths Hall.

Southern Association of Gas Engineers and Managers (Western District).—The next meeting of the Western District of the Association is fixed for 2.30 on Thursday, Nov. 15, at the offices of the Exeter Gas Company.

THE THERMAL EFFICIENCY FACTOR IN GAS MANUFACTURE.

[A Paper to be read before the Manchester and District Junior Gas Association on Nov. 7.]

By EDWARD CROWTHER, M.Eng., Assoc.M.Inst.C.E.

While it has always been one of the chief objects of the gas engineer to obtain the maximum yield of products from his raw material, it is only of comparatively recent years that the importance of a strict thermal analysis in assessing the performance of carbonizing and similar gas-works plant has received the recognition it deserves. This recognition, due largely to the rapid advances made by the industry in its knowledge of the theory of the processes on which it is based, and aided by the simultaneous improvement and development of recording and measuring instruments of all kinds, has reached its culmination in the substitution of the calorific for the illuminating standard. The researches both of individual workers and of organized bodies have placed at our disposal very complete data as to the efficiencies realized, and the distribution of heat, in various typical gas-making plants, and have familiarized us with the ideas of thermal efficiencies and heat balances in connection with such plant. It is questionable, however, whether full use has yet been made of the information available to serve as a starting point for further improvements in our processes.

OBJECT OF THE PAPER.

The object of this paper is to attempt to view a little of this information in that light, examining the possibilities of one or two processes, and the final limits imposed by theoretical considerations on their further improvement. At the outset, however, it is essential to realize the limitations of the strictly thermal standpoint. Even in the simplest processes involving the use of heat, many considerations—financial or otherwise—besides those of thermal efficiency may operate in determining the method to be adopted in carrying-out the process in question. Much more so must evidently be the case where the matter is one of a complex process such as the carbonization of coal, involving as it does the distribution of the potential heat of coal in a large number of directions, and in proportions which may be varied widely at will. This being so, the thermal factor must be reconciled with many others, such as chemical (calorific value of gas, ammonia yield, nature and yield of tar) and financial considerations (capital outlay, labour necessary, prices of bye-products, &c.). None the less, the importance of thermal efficiency can hardly be exaggerated; and any investigation in this direction cannot fail to be of the utmost service to the industry.

THERMAL EFFICIENCY.

Before passing on to the discussion of concrete results, it will be of interest to give some attention to the precise meaning of "thermal efficiency," both in its broadest sense and as applied to processes involved in gas manufacture. This point has given rise to considerable discussion at one time and another; and while in such cases the question has generally turned on a matter of nomenclature, it is by no means free from difficulties. All processes to which the idea of thermal efficiency is applicable involve the conversion of heat to some other form of energy, or its transference from one vehicle to another. Our definition of thermal efficiency may accordingly take the form of:

$$\frac{\text{Heat usefully converted (or transferred)}}{\text{Heat supplied}}$$

In the process of carbonization of coal, heat is supplied to the plant in the form of the potential heat of the coal. In the final products, portions of this heat appear as potential heat in gas, coke, and tar; while the remaining portion is dissipated in a variety of ways. If the process be regarded as a whole, and the heat carried by the gas, the coke, and the tar is considered as equally valuable, the thermal efficiency of the process becomes:

$$\frac{\text{Heat in products}}{\text{Heat in coal}}$$

This is known as the thermal efficiency of carbonization. If however, the gas be regarded as the only valuable product of the process, the expression becomes:

$$\frac{\text{Heat in gas}}{\text{Heat in coal}}$$

Neither of these values for thermal efficiency is entirely justifiable as a representation of the thermal performance of a carbonizing plant regarded as one for gas-making, since in the former a large portion of the heat credited to the plant as usefully converted is not available in the form of gas, and cannot be made so without further considerable thermal loss, while the latter value represents the same heat as entirely lost, which, of course, is not the case. As a compromise, it is now generally agreed to disregard entirely the heat recovered in products other than gaseous, treating it as absent from all stages of the operation; the value of the thermal efficiency of gas-making (so called) becoming:

$$\frac{\text{Total heat in products } \textit{minus} \text{ heat in non-gaseous products}}{\text{Heat in coal } \textit{minus} \text{ heat in non-gaseous products}}$$

This can be converted arithmetically to the form in which it usually appears—viz.:

$$\frac{\text{Heat in gas}}{\text{Heat in gas } \textit{plus} \text{ heat used and lost in carbonization}}$$

It should be emphasized that this formula is conventional rather than fundamental, giving a result depending not only on the plant and process, but also on the class of coal employed. It gives, however, in all normal cases, a much more correct representation of actual conditions than does either of the two preceding formulæ, and is a more useful basis for the comparison of different types of gas-making plant. For these reasons it is admissible. In passing, it may be noted that a similar convention is employed in calculating the thermal efficiency of a gas-engine on the net calorific value of the gas supplied to it.

STRAIGHT COAL GAS.

The manufacture of straight coal gas, from the thermal standpoint, involves the raising of the temperature of a given weight of coal to a predetermined point—during which process a variety of chemical and physical changes occurs—and the subsequent cooling to the original temperature of an equal weight of matter in the form of the different products of carbonization. The speed at which the temperature of the coal is raised to the final predetermined point, and the time during which it is maintained at this temperature, are matters of no theoretical importance, since it may be assumed that the progressive changes taking place will, for each particle of coal, take place instantaneously on its attaining the appropriate temperature, and no further changes will occur after it has reached its maximum temperature, no matter how long it remains at this temperature.

From purely theoretical reasoning, the only heat necessary to be supplied from external sources to bring about carbonization is that consequent upon the chemical and physical changes which occur; the sensible heat in the final products being recoverable for re-use by methods of heat interchange. The heat absorbed by these changes may be divided into three items:

(1) That used in bringing about purely chemical changes.
(2) That absorbed in doing work against atmospheric pressure; the volume occupied by the products of carbonization being greater than that occupied by the coal.
(3) That lost by reason of the average specific heat of the products of carbonization being greater than that of coal.

Of these, the second can readily be calculated, and will be found to amount to 27 B.Th.U. per c.ft. of gas produced, or normally about 1 p.ct. of the heat of the coal in the case of straight coal gas The third item can also be arrived at to some degree of exactitude, and will be found to amount to about 1 p.ct. of the heat of the coal when the latter is carbonized at about 2000° Fahr. In the present imperfect state of our knowledge of the constitution of coal, however, and of the nature of the chemical changes attendant upon its carbonization, we are unable to calculate the amount of heat necessary to bring about these changes, so that our only information available as to item (1) is derived from purely experimental sources.

In the fourth report of the Gas Investigation Committee (Uddingston tests) it is stated that "amounts of heat from 1·5 to 2 p.ct. of the heat value of the coal were absorbed in the distillation." This heat represents, of course, the sum of the three items above, so that it would appear that (at any rate in the case of the coal used in the Uddingston tests) item (1) is practically negligible; the endothermic and exothermic reactions balancing one another almost exactly. It is evident, therefore, that, in general, the unavoidable loss of heat involved in the carbonization of coal amounts to some 2 p.ct. only of its heat value, and that all further loss is due merely to what we may term imperfections in the process employed.

In modern straight coal-gas manufacture, it is customary to realize some 20 to 25 p.ct. of the heat of the coal as gas, while a further 15 to 18 p.ct. is dissipated in the process; the efficiency of gas-making being in the region of 55 to 60 p.ct. It is therefore evident that—leaving aside any question of the superiority of any other system of gas manufacture—the best plants available still fall very far short of the ultimate ideal, and that, in spite of the tremendous strides which have been made since the days of the direct-fired retort, there is still ample room for improvement and further economy in our methods. To arrive at some idea as to the degree of closeness to perfection to which in practice the process of carbonization can hope eventually to attain, it is necessary to study the details of our present methods of working—that is, essentially, our methods of raising the temperature of the coal, of applying the 2 p.ct. of heat strictly necessary for its carbonization, and of recovering for re-use the sensible heat in the products.

VERTICAL RETORTS.

Considering a modern setting of vertical retorts, the heat ordinarily dissipated in carbonization is distributed approximately as shown in the accompanying table.

—	Therms per Ton of Coal.	P.Ct.
(1) Required for carbonization*	5⅔	12
(2) As sensible heat in gas and tar	8½	18
(3) As sensible heat in coke	4⅔	10
(4) In radiation, &c., from setting	9½	20
(5) As sensible heat in waste gases	17	35
(6) Loss in ashes and unconsumed coke from producer	2½	5
	48	100

* About 2 p.ct. of the heat of the coal, as above.

Considering these items in the order given, theoretical reasoning would show them to be avoidable to the following extent:

Item (1)—Irreducible.

Item (2)—It may justifiably be assumed that the lowest temperature at which the gases may leave the retort, having parted with the bulk of their sensible heat to the entering coal, is 212° Fahr. At this temperature, and taking 60° Fahr. as the basic temperature of the operation, the heat withdrawn will amount to about 3½ therms per ton of coal.

Item (3)—The only way in which sensible heat can be taken from the coke is by using it to preheat air for the producer, in which case an equal amount must inevitably be lost in the waste gases (see under), or by using it to raise steam, when the process ceases to be strictly a straight coal-gas process. If, however, this latter system be admitted, the minimum temperature to which the coke can be reduced will be in the region of 212° Fahr., and the sensible heat carried away will amount to about ½ therm per ton of coal.

Item (4)—In theory, radiation losses are entirely avoidable, and in practice are being largely cut down by various insulating devices.

Item (5)—As will be shown below, it is theoretically possible to reduce waste-gas heat losses to some 5 p.ct. of the heat of the fuel consumed in the producer. This item may therefore be put down as ½ therm per ton of coal as the irreducible minimum.

Item (6) May become negligibly small under ideal conditions.

Totalling these items, we are faced with an irreducible loss of 10 therms per ton of coal, or some 3⅓ p.ct. of its heat, so that the maximum gas-making efficiency possible in straight coal-gas manufacture is in the region of 85 p.ct.

It now remains to be shown how it is possible in theory to reduce the waste-heat losses to the extremely low figure stated above. For this purpose it is necessary to go somewhat thoroughly into the details of producer-gas theory, concerning which many of the arguments are applicable also to water gas manufacture.

Let us first consider an ideal regenerative setting consisting of a producer fed with pure carbon and dry air only, a combustion chamber, and a secondary-air regenerator in which heat interchange can take place at 100 p.ct. efficiency. In the first stage of the combustion, in which each pound of carbon burns with 5·73 lbs. of air to form 2·33 lbs. of CO and 4·4 lbs. of N_2, 4303 B.Th.U. are liberated per lb. of carbon, raising the temperature of the gases formed by 2620° Fahr. In the second stage of the combustion a further 5·73 lbs. of air are admitted per lb. of carbon, forming as final products 3·67 lbs. of CO_2 and 8·8 lbs. of N_2, and liberating a further 10,197 B.Th.U. Assuming that the conditions are such that the waste gases have to be rejected to the regenerator at 2100° Fahr. above atmospheric temperature, they will carry with them 6160 B.Th.U., or 42·5 p.ct. of the original heat of the fuel. By preheating the secondary air to 2100° Fahr. above atmospheric temperature in the regenerator, 2855 B.Th.U. may be returned to the setting, so that the over-all efficiency of the setting becomes 77·2 p.ct.; the balance being rejected to the main flue.

The problem which presents itself is, therefore, to find a means of returning to the setting the heat so rejected. The use of the waste heat to preheat the primary air is not admissible, since a second and equally important problem—that of reducing the temperature of the producer—has to be faced in practice. For this latter purpose it is customary to introduce a proportion of steam or water with the primary air; its decomposition being attended with absorption of heat. In addition, the use of steam reduces the amount of primary air required per pound of carbon, increasing the secondary air by the same amount; the final products being 3·67 lbs. of CO_2 *plus* 8·8 lbs. of N_2, as before, *plus* the weight of steam introduced. The thermal effect of steam is, therefore, to increase the amount of heat returnable to the setting in the secondary air, while increasing also the amount of heat rejected to the regenerator, by reason of that carried by the steam. Each lb. of steam combining with carbon to form CO and H_2 transfers 3·83 lbs. of air from primary to secondary, which carries back 1960 B.Th.U. to the setting; while the steam (at 2100° Fahr.) carries from the setting 1975 B.Th.U. (967 B.Th.U. latent, *plus* 1008 B.Th.U. sensible), so that the efficiency is practically unchanged. If, however, the steam is raised in the first instance by means of the waste heat, the setting may be credited with a further 967 B.Th.U. per lb. of steam, with consequent gain in efficiency.

The limit to the proportion of steam to carbon which can be introduced, and consequently the possible gain to be effected, is low, since the reaction in the producer can only proceed at the expense of sensible heat generated by the combustion of further carbon in primary air, and, moreover, because as the temperature of the producer is reduced by the steam, the reaction tends to take the form $C + 2H_2O = CO_2 + 2H_2$, necessitating the use of twice as much steam to transfer air from primary to secondary as does the $C + H_2O = CO + H_2$ reaction. Also, as the

temperature falls, a proportion of the steam passes forward undecomposed, causing a further falling-off in the efficiency of the setting. For these reasons, the setting efficiency cannot be materially increased by the use of steam as at present practised; while if used to an extent beyond that strictly required to keep the producer reasonably cool, the efficiency will be considerably reduced.

Let us next consider the effect of a further development of the use of steam, raised by the waste gases, and preheated by them to the same temperature as the secondary air. If 4·3 lbs. of steam at 2100° Fahr. be supplied per lb. of carbon, it may be calculated that primary air will be needed to burn about 40 p.ct. of the carbon, and that a reaction temperature of about 1470° Fahr. will be maintained. For each lb. of carbon consumed, the following will enter the combustion chamber:

			Volumetric Percentage (Dry).
CO	1·315 lbs.	..	20 p.ct.
H_2	0 159 ,,	..	33 ,,
CO_2	1·602 ,,	..	15 ,,
N_2	2·12 ,,	..	32 ,,
H_2O (undec.)	2 87 ,,		

After burning with secondary air, the final products will carry into the regenerator 14,660 B.Th.U., of which 12,782 will be returned to the setting, giving an over-all efficiency of 87 p.ct.

A large proportion of the heat entering the regenerator exists as latent heat in the steam, so that to attain the necessary degree of regeneration, about half the steam must be condensed, an objection which rules out this device as impracticable.

A more promising expedient, which permits of all the air being preheated, while preventing the producer from becoming unduly hot, consists in returning to the producer some of the waste gases direct from the combustion chamber, together with a small amount of preheated primary air. By consuming half the carbon with air and the remainder with steam, the following reaction is obtained—

$$4C + 2CO_2 + O_2 + \text{nitrogen} = 6CO + \text{nitrogen};$$

the reaction temperature being 1510° Fahr. After burning with secondary air, the final products carry into the regenerator 9240 B.Th.U., of which 8790 are returned to the setting, thus giving an over-all efficiency of 97 p.ct. It is difficult to determine without actual experiment to what extent this process could be carried out in practice; but it seems certain that it could be employed to realize a considerable proportion of the heat at present wasted. Two outstanding practical difficulties present themselves. First, that of returning a definite proportion of the waste gases to the producer, and, secondly, that of maintaining the flow of the gases as a whole without the aid of chimney draught. Both of these can be solved by the use of mechanical draught, entailing, of course, the use of energy, which would have to be set off against any saving effected. Assuming that 300 c.ft. of gases per pound of carbon have to be moved against a head of 1 in. of water, 1560 ft. lbs. are required, equal to 2 B.Th.U., so that, even at a very low efficiency, the percentage energy required is negligibly small.

Considerable and increasing attention is being given at the present time to the use of the somewhat costly waste-heat boiler, for the purpose of recovering heat rejected from the regenerators of retort settings. The efficiency of recovery generally attained does not appear to exceed some 50 p.ct., and mechanical draught has to be employed. While, in the absence of any other means of waste-heat recovery, the waste-heat boiler can show a favourable return, it is suggested that it would be preferable to return the heat direct to the setting by some such means as have been indicated. The cost of the apparatus involved would certainly be less than that of a boiler and its auxiliaries; and there appears to be no *primâ facie* reason for supposing that at least as high a percentage saving could not be realized in practice.

Steaming in Vertical Retorts.

Returning to the consideration of gas-making processes, and having established the theoretical possibility of obtaining an efficiency of 85 p.ct. in the production of coal gas, a few notes on the effect of steaming in vertical retorts will not be out of place. In the Uddingston tests, it was found that the effect of moderate steaming was to increase the efficiency of gas-making. This is accounted for partly by the increased efficiency obtained in carbonizing the coal, due to the effect of internal carbonization, and partly because the heat losses in the setting do not increase in the same proportion as does the heat transferred to the gas, as follows: In obtaining (say) 10 therms in water gas, 7 therms are provided by the carbon entering into the reaction; the remaining 3 therms only having to be provided from external sources —that is, in this case, from the combustion chamber. Taking the setting efficiency at the same value as before (see table of heat losses in carbonization, above), the effect in practice of obtaining an extra 10 therms by steaming may be expected to be as follows:

	Therms Per Ton of Coal.
(1) Heat for carbonization	$5\frac{3}{4} + 1\frac{1}{4} = 7$
(2) As sensible heat in gas and tar	$8\frac{1}{2} + 1\frac{3}{4} = 10\frac{1}{2}$
(3) As sensible heat in coke	$4\frac{1}{4} + 0 = 4\frac{1}{4}$
(4) In radiation, &c., from setting	$9\frac{1}{2} + 0 = 9\frac{1}{2}$
(5) As sensible heat in waste gases	$17 + 1\frac{3}{4} = 18\frac{3}{4}$
(6) Loss in ashes, &c.	$2\frac{1}{4} + \frac{3}{4} = 2\frac{3}{4}$
	$48 + 5 = 53$

The efficiency of gas-making for the extra 10 therms is therefore $\frac{10}{10+5} = 67$ p.ct., and the over-all efficiency of gas-making is increased in this particular case from 55½ to 57 p.ct.

In practice, this increase of efficiency due to steaming is progressive up to about 20 p.ct. steaming, after which it commences to fall off, due to the difficulty of passing sufficient heat through the retort walls to maintain the temperature of the reaction. It may be noted in this connection that the efficiency of carbonization falls progressively with steaming, for obvious reasons. By reasoning similar to the above, it may be deducted that under theoretically perfect conditions, steaming has practically no effect on the thermal efficiency of gas-making, while it causes a drop in carbonizing efficiency as in practice.

Blue Water Gas.

Problems somewhat analogous to those involved in producer work are met with in the study of the thermal changes accompanying the manufacture of water gas. From figures given in the sixth report of the Gas Investigation Committee, the following may be given as typical of the distribution of heat.

—	P.Ct. of Heat Supplied.
Water Gas—	
Potential heat	46
Sensible heat in gas Heat in undecomposed steam Heat lost in raising steam, &c.	6½
Blow Gas—	
Potential and sensible heat	25
Heat used and lost in blower, &c.	8½
Balance—	
Ashes, clinker, radiation, &c.	14
	100

It is unnecessary to consider these items individually, with a view to finding the maximum efficiency theoretically possible, since similar arguments apply to those previously used. In examining the heat balance for practical possibilities of saving, however, one outstanding fact may be deduced—viz., the extremely low efficiency of the blow. Of the potential heat of the water gas, 30 p.ct. is provided from the sensible heat of the coke, in this case 13·8 p.ct. of the total heat supply. In developing this amount of sensible heat in the coke, a further 25 p.ct. of the total heat supply is lost in the blow gas, so that the efficiency of the blow amounts to $\frac{13{\cdot}8}{13{\cdot}8+25} = 35\frac{1}{2}$ p.ct. only. By using the waste heat of the blow gas to preheat the blow air, it should be easily possible in practice to restore (say) 60 p.ct. of this heat to the generator as sensible heat in the coke, whereby the efficiency of the blow would become $\frac{13{\cdot}8+15}{38{\cdot}8} = 74$ p.ct.

Working on these lines, the heat balance would be approximately as follows:

—	P.Ct. of Heat Supplied.
Water Gas—	
Potential heat	64
Sensible heat in gas. Heat in undecomposed steam. Heat lost in raising steam, &c.	9
Blow Gas—	
Potential and sensible heat	7
Heat used and lost in blower, &c.	6
Balance—	
Ashes, clinker, radiation, &c.	14
	100

This figure of 64 p.ct., which, it is suggested, is a practical possibility, is well in excess of that obtainable by employing the waste heat to raise the steam required for the operation; while the apparatus required for the process is of a very simple nature, consisting substantially of a regenerator only.

Total Gasification.

It will be of interest to consider the results obtainable in a total-gasification plant by a method of air regeneration as indicated above, and to compare them with those claimed for the plant invented and recently described by Dr. Travers and Mr. Clark, in which the heat in the blow gases is employed to distil the coal. They state that: "The heat required to carbonize the coal in this process (*i.e.*, in *non*-regenerative total-gasification processes) is of the order of 2½ times the heat available from the water gas generated . . ." On this assumption, the coal gas distilled by the water gas obtained in an air-regenerative system will be $\frac{1}{2\frac{1}{2}} \times \frac{64}{46} = 55\frac{1}{2}$ p.ct. of the total coal gas. Of the semi-coked fuel reaching the regenerator, about 60 p.ct. will be gasified, and the remainder lost in the blow, or otherwise. Therefore a

further 60 p.ct. of 44½ p ct. (equals 26½ p.ct.) of the coal gas will be recovered, making a total recovered of 82 p.ct. The total gas obtainable, in therms per ton, will therefore be:

Coal gas	82 p.ct. of 65	=	53
Water gas	64 p.ct. of 200	=	128
Total			181 Therms; the gas being of a calorific value of about 350 B.Th.U.

Taking into consideration the absence of certain complications involved in their plant, this result would compare very favourably with those claimed by Dr. Travers and Mr. Clark.

In conclusion, while the limits of this paper forbid any but the most superficial examination of the ground covered, its purpose will have been served if it has attracted attention to the directions in which further economies in our processes can most readily be effected.

COOKERY AND FOOD EXHIBITION.

The Many Advantages of Gas.

Held in the Royal Horticultural Hall, Vincent Square, S.W., last week, the twenty-seventh exhibition organized by the Universal Cookery and Food Association (instituted to spread a better knowledge of the various substances used as food, and the best and most economical methods of cooking) met with the success that it has been accustomed in former years to achieve. The attendance was particularly good, there being at times a queue of people waiting for admission; and the exhibits, culinary and otherwise, were regarded as even better than in previous years.

The big hotels in London and the Provinces were well represented, as well as the confectionery and other trades; while the various cookery competitions were extremely well supported. In fact the daily army and navy cookery competitions were a feature of the exhibition which aroused much interest on the part of the public. The various lectures on domestic cookery and other subjects, given in the adjoining Technical Institute by experts, were also appreciated to the full, as was evidenced by the crowded audience at each session. The whole of the demonstrations by the army and navy and other competitors were carried out on gas-cookers kindly loaned by Messrs. R. & A. Main and Messrs. William Sugg & Co.; and there is no doubt that the usefulness and economy of gas as a cooking agent were brought home to the general public in a marked degree.

GAS LIGHT AND COKE COMPANY'S GOOD DISPLAY.

Gas, as usual, was in other directions well represented in the exhibition. The Gas Light and Coke Company had a very attractive display, excellently arranged, of different gas appliances for lighting, heating, cooking, hot water, and other purposes. Glancing round the stand, one saw a "Koke" boiler, a Davis gas-iron, and a Ewart "Brilliant" geyser. Next to these was a working exhibit of gas-heated hot-water supply, provided by a latest type "Victor" combined set, which effectively drew attention to the efficiency of the "Victor" system as a means of producing hot water for the many purposes for which it is required. Then there came a Main maintenance cooker, a Radiation "Marlborough" fire, a Davis "Burn-All" refuse destructor, and a Parkinson oven griller. There was also shown a Sugg "Marlborough" wash copper—one of the latest productions of the firm—cast outside, and white enamelled inside; the pan and rim being in one piece, so as to prevent the water getting in between the inner and outer casings. The lighting was by "Nico" and Sugg burners, on Evered's fittings, all connected to pneumatic switches.

The Gas Light and Coke Company also exhibited some tasteful "accessories." There was a good selection of "Durosil" glass British-made cooking ware. Some of this was fitted in nickel stands for serving on the table. This oven ware is the latest addition to the many uses of "Durosil" resistant glass, which is also utilized for laboratory appliances, gas globes, chimneys, &c.—all purposes requiring power of endurance under extreme temperature conditions. Another feature was the "Universal" coffee percolator, which will operate successfully on a cooker hotplate or gas-ring, and by the aid of which delicious coffee may be rapidly made. Filled with cold water, the construction of this ingenious little pot is such that all the heat is concentrated round a small chamber in the base plate, and water is forced through an automatic valve and pumped up a tube on to the ground coffee. A minute or two after the pot is placed upon the stove, the water, lukewarm at first, and gradually increasing in temperature, is thus pumped up and filters down through the coffee. By the time the water has reached the boiling point, the coffee is ready to serve.

Altogether the stand was well arranged, and the exhibits nicely displayed. It appeared to be popular with the visitors, and received the highest possible award in the commercial group. The Company are to be congratulated upon their policy in showing at such an exhibition, where the uses of gas both in the home and in the catering world are brought prominently before hotel managers, chefs, and housewives.

THE "SEGAR" GRILL.

The only apparatus shown on the stand of the Richmond Gas Stove and Meter Company was the "Segar" gas-heated grill. This is a most effective appliance, and for it the judges at the exhibition awarded the firm a silver medal. When the griller is in operation, the heat is radiated on to both sides of the food by two upright rows of "Thermo XX" fuel, cooking both sides simultaneously, and thus improving the flavour and speeding the service. Useful for steaks, chops, fish, cutlets, kidneys, and toast, from six to eight pieces (according to size) may be cooked at one operation. Made to rest upon a bench, table, or specially prepared stand, the "Segar" grill is substantially constructed of cast iron firmly strapped and bolted. The interior is lined with best quality firebrick, and fitted with two burners running from back to front of the apparatus. These burners are each fitted with gas and air adjusters, and are easily controlled, and thoroughly even heat is always available. Sliding doors are fitted in front of the grill, to prevent the escape of heat. With it, steaks can be grilled in from three to four minutes, while toast takes only thirty seconds. The appliance is, in view of its numerous advantages, proving a great boon to hotel and restaurant proprietors who have installed it, and the demand for it is steadily on the increase.

In an annexe, the Carron Company had on view an imposing array of cooking apparatus for hotels, restaurants, and ships, heated by gas, coal, steam, and electricity. In the gas division, there was a range, roaster, pastry oven, hot closet, salamander, and coffee urn. Gas-heated urns were also exhibited by Mr. G. F. E. Bartlett. The "Quickfri" cooking pan shown by Messrs. Quickways, Ltd., is of pure British aluminium, with heat-retaining asbestos lining. As its names implies, it is designed for rapid cooking.

Back-Run Gas.

Reference was made on p. 262 of the "JOURNAL" to a process, now operating highly successfully in the United States, by which "back-run gas" is made in an ordinary water-gas set, so modified that steam is introduced into the gas off-take in the superheater, passing back through the superheater and carburettor in a superheated condition to the generator, where, combining with the carbon, it forms blue gas; the blue gas being then conducted to the wash box, and thence to the relief holder. The operation consists of three cycles—blow, up-run, and back-run; the back-run time being approximately 50 p.ct. of the total run period. Mr. D. J. Young has written to the "Gas Age-Record" to point out that this back-run gas is made by the Young-Whitwell patented process. It was invented by Mr. Young, and completely developed under his supervision at the gas plant in Everett (Wash.); while Mr. George E. Whitwell, formerly of the University of Washington, and now General Superintendent of the Tacoma Gas and Fuel Company, was associated with the work from the start. Mr. Young corrects a statement which had been made, that the original purpose of the process was to free chequer brick from carbon. Its conception was due to a fundamental study of heat loss, and the realization of the fact that this could be reduced by a counter-flow through the set. The results obtained have been as anticipated. The elimination of carbon from chequer brick, ability to use heavier and higher sulphur content oils, increased life of the chequer brick, decreased oil, coke, and steam consumption per 1000 c.ft., &c., have all been due, he says, to the fundamental soundness of the principle involved, and incidental to the increased thermal efficiency which the counter-flow produces.

Institution of Civil Engineers.—The opening meeting of the 105th session of the Institution will take place next Tuesday, at 6 o'clock, when the President, Sir Charles Langbridge Morgan, C.B.E. (who is Deputy-Chairman of the Bournemouth Gas and Water Company and a Director of the Brighton and Hove General Gas Company), will deliver his Inaugural Address.

Coal Tar Roofing Paint.—The composition of a roofing paint using coal tar as a basis is described in a recent United States patent. The paint—which is more or less elastic, thus allowing for expansion and shrinkage of the surface to which it is applied—consists of the following ingredients, substantially in the proportions stated: Coal tar, 1½ quarts; melted rubber compound, 1½ quarts; and varnish, 1 quart. These ingredients are all mixed together thoroughly. The tar and rubber compound form the body of the paint, while the varnish acts as a dryer, and at the same time renders the paint more lasting.

Detector for Water Vapour in Pipes.—An article by Messrs. E. R. Weaver and P. G. Ledig, in "Industrial and Engineering Chemistry," describes a simple device for determining the approximate concentration of water vapour in a gas. A glass tube is coated with platinum, and the coating divided by etching into two electrodes. Platinum wires sealed through the glass connect the electrodes to a measuring circuit. The resistance to alternating current of a thin film of a hygroscopic electrolyte bridging the gap between the electrodes is used as the measure of the water vapour in the atmosphere with which the film is in contact. Sulphuric and phosphoric and various hygroscopic acids can be used in forming the conducting film. The detector is simple, and easily adapted for use in high-pressure piping and other situations in which the determination of water vapour is usually attended with difficulty.

XUM

REGISTER OF PATENTS.

Counting and Indicating Apparatus for Gas-Meters.—No. 203,462.

GIBSON, R. K., of Edinburgh.

No. 18,658; Sept. 9, 1922.

This invention relates to an indicating mechanism of the type of the usual volumetric index for gas-meters, having a train of wheels working in gear, and consists in the use of twin intermediate wheels, whereby the distance or pitch between the centres of the graduated dials is extended to allow dials of a larger diameter to be used. These scales can be graduated either in cubic feet or in therms, or can be a combination of both with compound dials—*i.e.*, cubic feet and therm graduations, one within the other; or the dials may be tandem, one dial working within or in front of the other; the inner or front one having a pointer attached to the periphery and being removable and capable of revolving while the other remains stationary upon the meter.

The method of indicating was the subject of patent No. 184,818 [see "JOURNAL," Vol. CLIX., p. 708]; the present specification covering the arrangement for distancing the wheels of the index mechanism.

Production of Creosote for Impregnating Wood. No. 203,588.

VERMEIRE, I. F., of Brussels.

No. 32,615; Nov. 29, 1922. Convention Date, Oct. 10, 1922.

This invention relates to a process by means of which oil of creosote may be prepared and purified in such a manner as to be capable of being used directly for the impregnation of wood at ordinary pressure—that is to say, without employing apparatus wherein the wood is subjected either to a vacuum and to injection under pressure, or to an injection under pressure subsequent to a vacuum adapted to eliminate the excess of creosote.

The patentee states that when oils of creosote are subjected to agitation in the presence of small quantities of phenols such as carbolic acid, with which may be mixed coal tar and coal tar hydrocarbons such as light tar oil and benzole, the mixture being subjected to a more or less long agitation and then filtered, oils of creosote are obtained which effectively penetrate the pores of the wood which it is desired to impregnate.

A mixture is made as follows:

Creosote	70·0 parts.
Carbolic acid (commercial), 32 p.ct.	6·0 ,,
Coal tar	9·5 ,,
Light tar oil	8·0 ,,
Benzole	6·5 ,,
	100·0

This mixture is treated in a trough, provided with suitable agitation devices, for about two hours, during which the ammonia contained as an impurity in the coal tar is completely eliminated. A large portion of the ammonia is neutralized by the carbolic acid, the remainder being liberated by the heat of neutralization and agitation; and the ammonium salts formed are dissolved in the water contained in the carbolic acid.

The mixture is allowed to stand and cool; the larger portion of the impurities, among others the paraffins, contained in the mixture which is formed are allowed to settle, the paraffins being precipitated by the presence of carbolic acid in excess. The mixture is then decanted on a filter which is preferably formed by a column composed of layers of broken or pulverized coke or other absorbent carbon; the water and the ammonium salts which it contains in solution being absorbed by the carbon. The creosote thus obtained has a density of between 1·060 and 1·100.

For impregnating wood it suffices to soak the wood for a time; and the liquid may be contained in an open trough or tank at atmospheric pressure. In certain cases the creosote may be heated to about 100° C.; but it is possible to carry out the process at the ordinary temperature.

Distillation of Liquids.—No. 203,743.

MAJOR, J. L., of Norfolk Street, W.C.

No. 13,572; May 13, 1922. No. 18,807; July 8, 1922.

This invention relates to the continuous distillation of liquids such as crude petroleum or tar, and seeks to facilitate evaporation and to ensure good fractionation.

Patent No. 114,353 provided for the liquid to be distilled to be fed to the still in a number of streams through pipes extending from the bottom up through the liquid in the still, so that the liquid gradually acquires the temperature necessary for distillation to be commenced before its overflow into the body of the liquid in the still; the lighter vapours being disengaged on the liquid emerging from the pipes. The present invention has among its objects to improve the construction and operation of such a still and to provide simple and effective means for feeding the liquid under pressure.

Accordingly there is provided within the vapour space in the still a horizontal plate or tray against the under face of which the lighter vapours as they are released from the pipes impinge. The tray may be provided in a number of separate parts in the same plane. Where the vapours from the still are passed through a column or dephlegmator for better fractionation, the return liquid therefrom is discharged on to the plate or tray through a sealed outlet, and is subjected to heating from a steam-coil on the tray. The flange of the latter may be notched to facilitate the overflow into the body of the still of the return liquid not vapourized.

The invention also provides for a dead weight valve of simple construction on the end of each vertical pipe; the design permitting the addition of weights, so as to vary the pressure to which the liquid is subjected before discharge. Alternatively, a number of pipes may discharge into a box the outlet from which is provided with a dead-weight valve.

Alarm Signal for Automatic Water-Gas Set. No. 203,755.

HUMPHREYS AND GLASGOW, LTD., of Victoria Street, S.W.
(A communication from J. H. TAUSSIG, of Philadelphia.)

No. 15,756; June 6, 1922.

The patentees point out that in an automatic water-gas set there is a control mechanism for opening and closing the apparatus valves in certain groups and at intervals marking the blow and the run. Such mechanism usually includes a master element or elements, as a time-driven shaft, the movement of which, acting through various kinds of relay apparatus, effects the actual movement of the valves for various functions.

The object of the present invention is to avoid the necessity for close supervision, so that the operator in charge of an automatic water-gas set may be enabled to perform other duties with certainty that he will be called if anything goes wrong, and promptly advised just which valve has failed.

The full details and drawings would be necessary to elucidate the patent; and the claims must suffice in this notice. They are:

1. In an automatic water-gas set, an electric signal system wherein indicating devices such as lamps are, in accordance with movement of the valve apparatus of the set, controlled by switches adapted to operate an audible alarm in the event of any one valve of the whole set of valves (or of a limited number of the valves) not being in its right rest or limit position.

2. A system according to the preceding claim in which means are provided for controlling the circuit connections to silence the alarm during the time the valves are moving between their rest or limit positions.

3. In such a system the combination with a local alarm circuit of a system of relays, the circuit of one of which includes the arms of all the switches associated with the respective valve apparatus; the arrangement being such that the local alarm circuit is open as long as one relay is energized.

4. The actual system described and illustrated in the specification.

Lining Pipes.—No. 203,937.

STANTON IRONWORKS COMPANY, LTD., and WILSON, P. H., both of Nottingham.

No. 28,944; Oct. 24, 1922.

The invention consists broadly in a pipe provided with a cement or concrete lining applied and laid under centrifugal force and extending over the ends of the pipe, in means for securing or reinforcing the lining at the pipe ends, and in devices for facilitating the moulding of the ends.

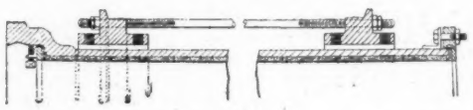


Fig 1.

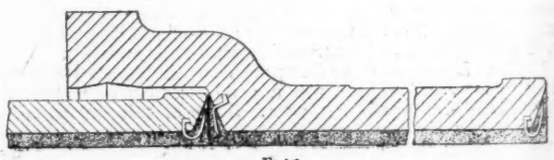


Fig 2.

Concrete-Lining Pipes.

Fig. 1 shows a longitudinal half-section through a cast-iron pipe length provided with suitable fittings for the centrifugal lining operation; and fig. 2 is an enlarged section of a joint.

The pipe to be lined is supported in a suitable cage provided with a rolling surface adapted to engage with driving runners, such as are employed in the Hume process for making concrete pipes. In order to retain the lining while in the fluid or semi-fluid state, the spigot end of the pipe is provided with a ring slid over the pipe and attached by bolts to an angle-ring in halves which is clamped to the exterior of the pipe. This moulding ring has a flange which extends inwardly over the spigot, and just sufficiently to determine the thickness of the layer of cement or concrete to be laid within the pipe. The socket end is provided with a moulding ring which slips inside the faucet and is provided on its exterior side with lugs, at intervals through which pass screw-centring studs bearing on the inside periphery of the faucet. The exterior periphery of the socket ring is preferably provided with a packing of gutta-percha. Both the spigot and the socket shoulders are tapered off so that the lining may form an unbroken protective surface.

In casting the pipe itself, iron sprigs are supported in the core at short circumferential distances, so that they become integral with the casting; being afterwards bent round (splayed in different directions) to form a reinforcement for the lining, as seen in fig. 2.

Automatic Compensation of Pendulum-Controlled Mechanism.—No. 203,810.

PARKINSON AND COWAN, LTD., and BEASLEY, C. H., both of Birmingham.

No. 16,961; June 20, 1922.

This invention has reference to the automatic compensation of clocks and other pendulum-controlled mechanism such as is used in connection with apparatus for metering, or governing or regulating the supply of, gas or fluid, and consists in improved means for automatically and exactly varying the oscillation arc of a pendulum with the object of compensating for, or correcting, the effects of variations in barometric or other pressure and temperature on the volume of the gas or fluid; thereby ensuring the delivery of a constant and predetermined quantity of gas or fluid per time unit irrespective of the varying pressure and temperature conditions.

The improvement which is the subject of this patent was described by Mr. Beasley at a joint meeting of the Birmingham and Midland Section of the Society of Chemical Industry and the Midland Junior Gas Association during the recent National Gas Exhibition. His paper and the ensuing discussion will be found on p. 49 of this volume of the "JOURNAL."

As briefly set out by the patentees, "the compensator comprises, or consists of, an auxiliary brake or governor spring that is connected mechanically with an aneroid or other source of movement susceptible to the effects of pressure and temperature variations, and operates by imposing a variable resistance (determined by, and changing with variations in, pressure and temperature conditions) on the movement of a pendulum for increasing or decreasing the arc of oscillation of such pendulum, and correspondingly accelerating or retarding the metering drum or similar device wherewith the pendulum is connected."

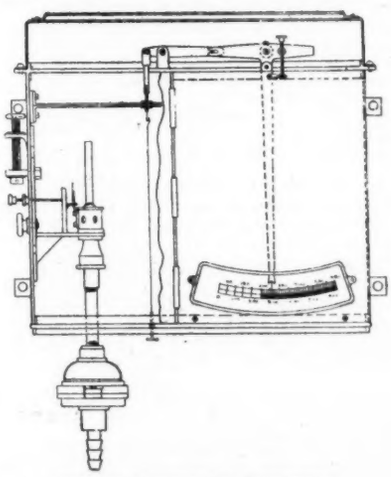
Indicating the Heating Quality of Gas.—No. 203,949.

PEEBLES, W. C., of Edinburgh.

No. 30,182; Nov. 4, 1922.

This invention has for its object to provide an inexpensive and handy form of what may be termed a "comparative calorimeter," readily adjustable with the readings given by a standard calorimeter so that, when once so adjusted, sufficiently accurate readings, indicating the specific heating quality of a gas as compared with the standard, may be taken from time to time.

The instrument comprises essentially a bar secured at one end and built-up of metal strips of different coefficients of expansion so that, when heated, it will flex and move a pointer connected to it over a scale indicating B.Th.U., a bunsen burner with adjustable volumetric and pressure governors, means for controlling the air supply to the burner, and for adjusting the distance of the burner from the bar.



Peebles' Comparative Calorimeter.

These parts will be recognized in the drawing reproduced; and it will be noticed that the flexible bar is secured to one end of the case and the connections between its free end and the pointer comprise a link (the lower end of which is connected to a screw adjustably held in an aperture in the bar) and two levers, the adjacent ends of which are connected together by a pin adjustably secured in slots, so that the extent to which the second lever, and consequently the pointer, is rocked may be varied. The screw in the flexible bar, the position of the burner, and the air supply to the latter, are all adjustable by thumb-screws outside the case; and the pointer may also be adjusted by the screw seen near its point of attachment to the lever.

In operation, the link connection between the flexible plate and the levers is first adjusted to bring the pointer to zero on the scale; then the air regulator is so adjusted that the white flame is just disappearing. The height of the bunsen burner is then adjusted so that the top inner blue cone of the flame is on a level with a line indicated on the back of the case. In this position, with the volume of the gas adjusted by the regulating screw in the volumetric governor, the point of the flame will just impinge on the underside of the flexible bar. The heat of the flame causes the bar to flex and the pointer to travel over the scale and indicate the calorific quality of the gas. To adjust the instrument before it leaves the manufacturer, the burner is first supplied with gas of a quality determined by a standard calorimeter; and if the pointer should not exactly indicate this quality, the connection between the two levers is adjusted so as to vary the range of travel of the pointer over the scale.

Once so adjusted the instrument will show at a glance approximately the quality of the gas being made from time to time.

Wet Gas-Meters.—No. 204,069.

FOX, T., and ROBINSON, S., both of Liverpool.

No. 8003; March 20, 1922.

The object of this invention is to provide for wet meters a drum of which the capacity for passing gas is increased for any given size.

The main feature is that in a drum with overlapping compartments having inlet openings on one side of the drum and outlet openings on the other and formed by a plurality of strips (each of which constitutes a portion of the front and rear faces and is joined by an inclined portion), the ends of the latter forming with adjacent strips radial openings extending from the centre to the periphery. These openings are of a constant taper from a maximum at the periphery to the centre of the drum.

The result is that an increased velocity of the drum is obtained owing to the inclination of the compartment surfaces and the relatively large openings—in fact, it has been found that the drum of the above construction is capable of passing double the quantity of gas passed by drums of prior constructions of the same size.

Automatic Pressure Regulation.—No. 204,232.

WIDLAKE, H. C., of Plymouth.

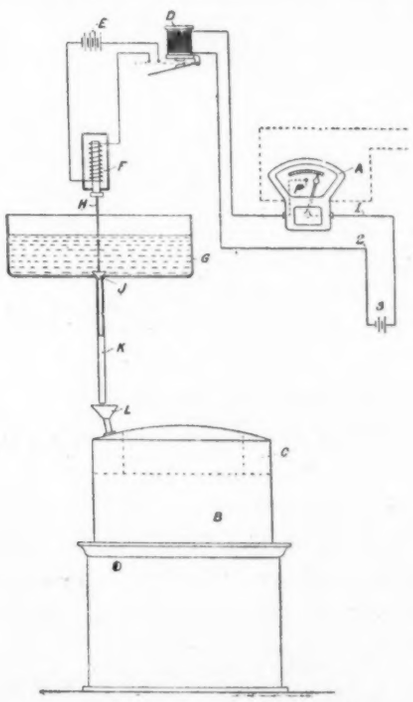
No. 30,236; Nov. 4, 1922.

This invention has for its object to provide an improved method of, and means for effecting, regulation of pressure at distant points of a gas-supply system.

The patentee prefers to make use of the distance indicator invented by him, which was described in the "JOURNAL," Vol. CLIV., pp. 376 378.

Such an indicator is, in the accompanying diagram, shown at A connected to electric leads 1 and 2 in circuit with a local battery 3; the indicator being arranged to register the pressure prevailing in the gas system at the distant point at which it is desired to maintain the pressure constant. The leads 1 and 2 are connected to the winding of a relay D the armature of which, when the relay is energized, closes the circuit of an electromagnet F, which is supplied by any suitable source of current—for instance, the battery E.

The electromagnet is arranged over a cistern G containing water which communicates, through a pipe K, with a station governor B which has the usual annular loading chamber C. The pipe K issues



Widlake's Distance Pressure-Regulator.

into a funnel shaped opening L attached to C. The entrance to K is controlled by means of a valve J connected by a rod H to the core of the solenoid F. The movement of the bell from one level to another is utilized for actuating the regulating valve controlling the supply of gas to the distant part of the system.

A small drain of water from the annular loading chamber C, combined with a similar small drain of water from the cistern G through the valve J, permits of a constant flow of water from the loading chamber. The degree of loading is determined by the ratio between the incoming and the outgoing streams of water.

In operation, supposing the pressure falls somewhat at the distant point; the pointer of the pressure indicator A moves over to indicate

the fall of pressure and in so doing closes the circuit of the relay D at the contact P.

The system may be modified to regulate a compressor in the case of higher-pressure work; and the patentee claims to vary the general principle in other ways, if desired.

Horizontal-Retort Producer Lids.—No. 204,195.

Toogood, H J., and Dempster, R., & Sons, Ltd., both of Elland.

No 24 108; Sept. 6, 1922.

The patentees point out that the charging lids of furnaces or producers for horizontal gas-retorts in practice are liable to warp, thereby allowing air to enter the furnace, or producer gas to escape therefrom. This is detrimental to the best working of the producer, to the life of the ironwork, to the comfort of the men, and to the maintenance of a general state of high efficiency.

According to their invention, the lid is so constructed that in addition to making a metal-to-metal seal with the furnace door frame, the joint can readily be sealed by dust, sand, or the like, without letting the door or lid into the seating. Coke dust, for instance, can be swept from the retort-house floor after the charging of the furnace; on the opening of the door, it falls harmlessly away.

Such a lid is formed with two flanges spaced apart and arranged to make a metal-to-metal seal with the frame; the flanges being connected at intervals by distance-pieces so shaped as to form a continuous passage for the sealing medium.

Cooker Plate-Rack Uprights.—No. 204,229.

Brentford Gas Company and Johnston, A. A., of Ealing.

No. 29,116; Oct. 25, 1922.

The patentees' object is to improve upon the method of securing the uprights of gas-cooker plate racks by means of jaws and clamping screws, and thus to gain greater security and neatness.

Accordingly, they provide at the rear of the hotplate sockets of rectangular section, the back face of which is tapered slightly towards the front. The uprights are formed with corresponding stub ends and shoulders. The sockets may be cast integral with the cornice, or may be incorporated in angle-pieces which are screwed on to the hotplate.

Coke Pusher.—No. 204,238.

Williams, R. A., of Newark.

No. 31,426; Nov. 17, 1922.

This invention relates to a coke pusher, for horizontal or inclined retorts, of the kind which is wound on a drum mounted on a carriage. The object is to provide an improved construction of the ram.

The head of the ram is made rigid, while the remaining portion is composed of block links to permit of its being coiled up on the drum. Solid cylindrical, or tubular, pivot pins are interposed between the ends of adjacent block links and fit in correspondingly shaped open recesses in the ends of the links; and both the block links and pivot pins are formed with a continuous passage running longitudinally through the whole of the parts when assembled, for the reception of a connecting chain or wire rope threaded through them. One end of this chain is secured to the front section of the ram and the other end to the last block link, which is attached to the drum. For tensioning the chain or rope, and at the same time permitting of variations in the effective length as the ram expands or contracts, the chain is connected to the last block link by an eye bolt or other suitable means through an interposed compression spring.

The coiling is effected by sprocket wheels engaging with the projecting ends of the pivot pins. Alternatively, power may be applied to the drum.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 24.]

Nos. 25,603 to 26,252.

Brooke, T.—"Regulation of air supply to gas-producers, &c." No. 25,755.

Chesterton, Jones, and Co.—"Plug cocks for gas, &c." No. 25,752.

Dempster and Sons, Ltd., R.—"Valves for gas-purifiers, &c." No. 25,769.

Duplan, F.—"Furnaces for distillation and carbonization." No. 25,854.

Flavel, P.—"Oven doors." No. 26,217.

Flavel, P.—"Gas cooking stoves." No. 26,218.

Glover, W. R., and Glover and Co., Ltd., T.—"Coin-freed gas-meters." No. 25,685.

Horsfall, J. E.—See Dempster and Sons, Ltd., R. No. 25,769.

Hosler, R.—"Gas-heated boilers, &c." No. 25,809.

Jones, A. J.—See Chesterton, Jones, and Co. No. 25,752.

Jones, F. W. Salisbury-.—"Distillation of coal, &c." No. 26,100.

Knight, E. O.—"Incandescent gas mantle ring fitting." No. 26,091.

Lumb, H.—See Dempster and Sons, Ltd., R. No. 25,769.

Lux, H.—"Photometers." No. 25,911.

Mellor, P. H.—"Gas-fires." No. 26,137.

Palmer, C. J.—"Index frame for gas-meters." No. 25,776.

Parker, C. H.—See Jones, F. W. Salisbury-. No. 26,100.

Radiation, Ltd.—See Mellor, P. H. No. 26,137.

Stokes, R. O.—"Valve mechanism for controlling supply and exhaust of fluids." No. 26,028.

Yates, H. J.—See Mellor, P. H. No. 26,137.

MISCELLANEOUS NEWS.

STANDARD GAS-COOKERS.

Addenda to the Specification.

At a Meeting of the Central Executive Board of the National Gas Council on Sept. 11, it was reported that the Gas Appliances Specification Committee of the Council had met that morning, and submitted the following addenda to the specification dated March 31, 1922. The addenda contain modifications and additional constructional details in regard to burners, taps, open-top grids, &c.

1. The door and side castings to be finished in a very shallow diaper pattern (see p. 31, original specification).
2. The base stands to be 5 in. over-all in height, instead of 4 in. (see p. 31, original specification).
3. The cast hot-plate grids of the Nos. 2 and 3 have been slightly altered in design to increase thermal efficiency and further improve combustion of gas.
4. The lug on inner side of hot-plate bridges to be increased beyond 4 in. in length, as per pattern (see p. 33 of the original specification—eighth paragraph).
5. The ribs for affixing plate-rack standards to be formed on the outer faces of the bridges, and not on the inside faces (see p. 33 of original specification—ninth paragraph).
6. The oven gate racks to be made of stout cast iron instead of wrought steel (see p. 38, original specification—third paragraph), and interchangeable and reversible.
7. The browning sheet for the No. 2 (unpacked) to be 11 in. in depth, and for the No. 3 (packed) 13 in. in depth.
8. An alternative enamelled oven door to be supplied with the Council's official badge plainly and neatly printed in black in the centre of the white enamelled panel.
9. A special cast flue outlet return elbow can be supplied where required to fit over the existing flue outlet casting.

1. *Burners.*—The whole of the flame orifices for the boiling, grilling, and oven burners to be drilled with a No. 29 Morse drill (0·134 in. diameter, and not $\frac{1}{8}$ in. as stated in the last paragraph, p. 33 of the original specification, and on p. 34 *re* grill burners).
2. The hot-plate and oven taps to be of 60/40 brass as specified; the oven tap to be of the special approved self-locking type, as pattern, and not as originally specified (see p. 36 of specification). The taper of all plugs to be 7 degrees, and thoroughly well ground-in.
3. All taps must pass a submerged test with gas at a pressure of not less than 20 in. water-gauge with the plug in the "off" position, and again tested with the plug being gradually turned to the open position. The cast-iron tap rail must pass a similar test.
4. *Injectors.*—All the injector nozzles for the 15 ft. and 24 ft. burners, including the grill and oven burners for the Nos. 2 and 3 cookers, to be drilled with a No. 29 Morse drill (0·134 in. diameter), with proper gas adjusting pin as per pattern of tap and adjuster approved.

These addenda were approved by the Central Executive Board.

Conditions of Manufacture.

The following recommendations of the Gas Appliances Specification Committee were also approved by the Central Executive Board.

(*a*) To facilitate manufacture and enable gas undertakings to deal direct with manufacturers, it is recommended that any firm approved by the Council should be allowed to obtain a complete set of working patterns and jigs through the Council, and that the Council should arrange for their contractors (the Parkinson Stove Company) to provide these at a fixed cost to be decided upon.

(*b*) That a definite period should be decided upon between the Council and their contractors for the manufacture and supply of the patterns and jigs above referred to.

(*c*) That each manufacturer desiring to purchase a set or sets of such patterns and jigs through the Council should sign an agreement with the Council, such agreement setting forth a maximum sale price to gas undertakings of each pattern of cooker; and, further, such agreement should state that the maximum price should not be exceeded by any firm unless by special arrangement with the National Gas Council, who may find it reasonable to allow an increase in price in consequence of any undue dislocation of trade, exceptional increases in the price of coal, iron, &c., or for any other unforeseen reasons.

(*d*) That to expedite delivery, the Council should grant provisional licence to the Parkinson Stove Company to supply direct to gas undertakings sample cookers to the number of 500 of each pattern, in addition to the 24 sample cookers for which the Council have already placed an order with that firm. This licence should specify a maximum sale price to gas undertakings.

(*e*) That, in view of the continued popularity of cookers of the type specified as No. 1, it is now recommended that the Council make arrangements for the manufacture of master patterns and jigs of this cooker and stand, at an estimated cost of £150.

The Council are preparing a tripartite agreement to give effect to recommendations (*a*), (*b*), and (*c*).

The Council are also preparing a draft model form of contract between manufacturers of the standard cookers and gas undertakings purchasing these; and such contracts will admit of each undertaking incorporating therein any special conditions they may deem necessary.

GAS REGULATION ACT APPLICATIONS.

The following notice has appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Skipton Urban District Council.

Notice is given by the Council that they have applied to the Board of Trade for a Special Order under section 10, to extend the limits of supply so as to include the parishes of Stirton with Thorleby and Gargrave, to increase their borrowing powers, and to make new provisions as to charges for, and the supply of, gas.

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Bakewell Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 14d. per therm. (Oct. 24.)

Huyton and Roby Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15d. per therm. (Oct. 20.)

NEWQUAY GAS ORDER.

Mr. H. C. HONEY (Director of Gas Administration at the Board of Trade) held an inquiry at Newquay into the application of the Newquay Gas Company for an Order for conferring powers to carry out works of extension.

The Company were represented by Mr. A. B. Winser, of Westminster, Mr. E. W. Biddick (Manager), and Mr. J. Butler (Works Manager). Objections were lodged by Miss B. H. M. Hicks, Cliff Road; Mrs. H. Hoskin, Cliff Terrace; Mr. and Mrs. J. R. Riche; and Mrs L. Williams.

Mr. WINSER explained that the chief reason for acquiring additional land for the use of the gas-works was because they had insufficient room, in a place where the consumption of gas was continually increasing. In 1914 the consumption was 11,900,000 c.ft.; in 1922, 24,000,000 c.ft.; and up to September this year, 18,000,000 c.ft. So that probably it would be up to 26,000,000 c.ft. by the end of the year. On the new land purchased they had already erected a holder and purifier shed. Additional room was required for coal and coke storage, and there was also a showroom to be built. Mrs. Hoskin, he said, objected to the smell which arose on discharging the retorts. He believed, however, the smell came from the purifiers. By the third day, the odour was removed; and the clearing of the purifiers was only necessary about once in three months. On any occasion when there was a smell, it did not last more than three days. The objection was against gas-works as such. It would be almost impossible to get rid of the objection, whether the application was granted or not.

Mrs. HOSKIN said if the Company had given a better idea of what they were going to do, she would not have carried on with the objection. She was surprised that other objectors were not present.

Mr. HONEY said the new site was farther away from Cliff Road than the existing one; and it was difficult to see how the nuisance from it was going to affect the people in that road.

Mr. BUTLER said they could make 100,000 c.ft. of gas a day.

Mr. HONEY gathered that Mrs. Hoskin did not press her objection, and said he almost regarded the application as being unopposed. He saw no reason why he should not recommend the Board of Trade to grant the Order, particularly as the Urban Council had agreed with the Company, and the clauses had been arranged.

Another Reduction at Reading.—The Reading Gas Company have given notice of another reduction in the price of gas—making the third reduction this year—to take effect from the Michaelmas meter readings, and bringing the price down to 8½d. per therm. Since Lady Day, 1922, the price has been reduced by 2½d. per therm, or nearly 1s. 1d. per 1000 c.ft.

Londonderry Gas Supply.—The quality of gas supplied by the Londonderry Gas Company was criticized at a Corporation meeting by Alderman D. P. Thompson, who argued that the system of testing and charging for gas did not take into account its calorific value. He moved that the Gas Company be requested to instal a heat-recording calorimeter, the records to be open to the inspection and verification of the City Engineer or other qualified officer appointed by the Corporation. Alderman Blair seconded. Mr. Watson said the Company were spending thousands of pounds installing new plant, and in the transition stage things were probably not all that they should be. On this ground, he thought action by the Corporation was premature. Mr. Gilliland failed to see what *locus standi* the Corporation had in the matter. It was expected that a supply would be given from the new plant as from Nov. 1, and it was hoped to reduce the price of gas. Mr. Robinson thought it strange that Alderman Thompson, who was Chairman of the Electric Lighting Committee, should complain about the quality of the gas, and expressed the view that the Company should be left to deal with their own interests. Alderman M'Farland said people were talking about the therm and calorific value, who knew nothing about either. Alderman Thompson observed that he acted in the interests of the workers, who could not afford to instal electric light. Ultimately he agreed to withdraw his motion for the present.

EASTBOURNE GAS ORDER.

The application of the Eastbourne Gas Company for an Order under section 10 of the Gas Regulation Act was the subject of an inquiry by Mr. H. C. HONEY (the Director of the Gas Administration) at the offices of the Board, on Friday, Oct. 19.

The Company were represented by Mr. A. M. PADDON; and the two opponents—the Eastbourne Corporation and the Eastbourne Rural District Council—by Mr. H. GIBBON PRITCHARD (Messrs. Sharpe & Co., Parliamentary Agents) and Mr. A. J. LEES (Messrs. Lees & Co., Parliamentary Agents), respectively. Mr. ARTHUR VALON, M.Inst.C.E., was also present on behalf of the Eastbourne Corporation. Originally there had been four opponents; but the other two—the East Sussex Rural District Council and the Southern Railway Company—had been settled with.

Mr. PADDON said the Eastbourne Gas Company operated under Acts of Parliament dating from 1868, and in 1901 obtained an Order from the Board of Trade with regard to the method of charging. The present application was a most conventional and orthodox one, and related to an extension of area, an increase in capital, and a modification in the operation of the sliding-scale which affected the payment of dividends. Under clause 4 of the draft Order, it was asked that the parishes of Berwick, Eastdean, Folkington, Friston, Jevington, Littlington, Lullington, Lullington Detached, Westdean, and Wilmington, all in the rural district of Eastbourne, should be added to the Company's existing area. This extension was asked for in the Company's Bill of 1909, but at that time Parliament did not see fit to assent. Fourteen years had elapsed, however, and the Eastbourne Company again asked for powers to supply in these districts, as the only Company who could ever give a supply. The Company had received applications for gas from various parts of the districts asked for, which were a natural extension of the existing limits. As a matter of fact, in one of the districts mains were actually being laid now, though admittedly without powers. Objection was taken by the Rural District Council to the Company going into these areas, for what reason he could not understand, as he would have thought that anything leading to a reasonable amount of employment in these times would be welcomed. The Company proposed that their powers should cease in five years, if they were not exercised, and another company were able to give a supply. With regard to the capital proposed under the Bill, since the draft Order was issued, the estimates had been carefully gone through again, and a revision had been made, so that, instead of something over £180,000 new capital powers being asked for, the amount now was £133,495. A feature which might be said to be a peculiar one in relation to this Company was that hitherto they had no loan capital; but as the ordinary capital had been issued at the low rate of interest of 4¼ p.ct., the public had not been very much hurt, inasmuch as this rate was an approximation to that at which loan capital could have been placed. During the war the dividend on the ordinary stock fell to 2⅝ p.ct.; and had there been loan capital at a fixed rate of interest, it would have meant the raising of the price of gas in order to pay this. Thus, actually the consumer was better off than if the Company had raised loan capital. The estimates of future expenditure had been based on £800 per million c.ft. of gas; the present figure being £400 per million. As to the increase in the Company's business, for the decade ended 1902, this had been at the rate of 5¼ p.ct.; during the next ten years, the rate was 4 p.ct.; and up to 1922, which included the war, the rate was only 1¼ p.ct. But things were improving now, and the rate of increase was growing. During the past year, the increase had been 5½ p.ct.

Counsel next dealt with clauses 20 and 22 of the Order, dealing with the change in the sliding-scale, and the consequential effect upon the dividends. Clause 22 provides that, for the purposes of section 17 (standard price; dividend dependent on price charged) of the Company's Act of 1880, as amended by the Order of 1921, the price charged by the Company in any year shall be deemed to be the average of the price charged in each of the four quarters of such year. The effect is to make the slide a quarterly instead of a half-yearly one, as proposed in the Wolverhampton Order recently before the Director [see *ante*, p. 206]. Mr. Paddon suggested that this was simply a progressive application of the spirit, purpose, and principle of the sliding-scale. The Model Bill application of the sliding-scale was not in the same terms on both sides of the standard price, because it said that if at any time of the period to which the sliding-scale related the price of gas was increased, this governed the whole period in penalizing the Company with regard to dividends. The practical effect of this was that a company were not sure they would get any benefit out of a reduction of price in the early part of the year, because, if for any reason the price had to to be increased in the latter period of the year, then the whole benefit of the previous reduction was lost to the shareholders. Thus there was no incentive to the Company to reduce the price of gas at any time during the year, and so both the consumers and the shareholders suffered. Under the proposal in the Order, the Company would have every incentive to reduce the price of gas in any quarter, because they knew they would not be penalized as regarded that particular quarter by what happened in the other quarters. Clause 20 of the Order said that the average of the first two quarters' dividend of the year should be the basis of the interim dividend; and these two sections of the Order together constituted a greater protection to the Company, and at the same time gave them more incentive to reduce the price at any time during the year.

Dealing with the objections of the Eastbourne Corporation, Counsel said the Company saw the Corporation in opposition with pained surprise, because in the past the relations between the two had been of the most amicable and reciprocal character. The first point taken objection to was the proposed differential of 1d. per therm in the new area, which it was said was not sufficient, and would injure the consumers in the present area. As a matter of fact, he did not think Parliament had ever viewed this question of differential favourably, and it was an extraordinary position that the Company should be incited to increase the proposed differential rate. Parliament always cut it down to the lowest possible limit, and he did not believe the Board of Trade favoured a differential rate at all, where it could possibly be avoided.

Actually, the Company were sorry to ask for this differential. Then the Corporation said the amount of additional capital was too much. As regarded the auction clauses, the Corporation asked for a copy of the report that had to be sent to the Board of Trade stating the total amount of each stock raised, together with the premiums. He did not believe any other public authority enjoyed this privilege. The formalities were irksome enough already, without adding to them in this way. Then the Corporation asked for a copy of the application which had to be made to a Justice of the Peace in order to obtain his certificate under section 40 of the Companies Clauses Consolidation Act, 1845, that the whole of the capital in respect of which the power of borrowing was being exercised, including the premium (if any) realized, had been issued and fully paid up.

Mr. Honey: Do you press that?

Mr. Pritchard: We should like you to consider it.

Mr. Paddon described this as captious. Passing on, he next mentioned that the Corporation objected to the proposal in clause 17 to pay commissions on capital subscribed, which the Company would not do unless absolutely necessary. At the same time, it was a common form clause. Finally, the Corporation objected to clause 31, which gave the Company power to specify the size and material of pipes on consumers' premises. The Company had agreed to give the Corporation a copy of any such specification, but the Corporation required notice of any specification which it was proposed to make.

Mr. Honey said that, if any such clause were inserted, he should prefer the one in the Gas Light and Coke Company's Order of 1922 (section 33), because he thought it was a more workable clause.

Mr. Paddon said he would agree to that.

Mr. Pritchard remarked that this was only another way of doing what he wanted, and he was satisfied.

Mr. Paddon then briefly referred to the objections of the Eastbourne Rural District Council which were to any extension of area in the rural district, unless the Company's powers ceased at the end of three years, if not exercised, whether anyone else came forward or not. The Company proposed a cessor of powers clause at the end of five years, on the application of another promoter.

Mr. *J. S. Garrard* (Secretary to the Company) said there had been applications in respect of gas supply in some of the districts asked for, and the Directors were convinced that a profitable business would be done there. At the present moment a main was being laid in Jevington, as a continuation from the Hailsham district now in the Company's area; but it was not until after the work had begun that he realized he was outside his area, and had therefore laid this main without powers. There were also new houses being built in Eastdean, and he had been asked when a supply would be given. To reach this district would only mean the laying of 1¼ miles of main. As to the differential, he personally thought it was too low; but the Directors were prepared to supply the districts in question on these terms, and believed that it would be profitable in a very short time, as once the gas was available there was little doubt the districts would develop rapidly. The price of gas in Eastbourne was 10d. per therm.

Mr. Pritchard, in his cross-examination for the Corporation, said that, though the shareholders were only getting 4⅜ p.ct. on what they paid for their stock, the Company were actually paying 9½ p.ct. on the money they received, and witness agreed. It was also put that debentures could have been issued at a much lower rate than 9 p.ct. In answer to further questions, witness said it was not suggested that the Company would start to give a supply in all the ten districts asked for at once; the date of the supply would naturally depend upon the demand.

Mr. Lees, in his cross-examination, put it that there was no chance of the Company going to these districts in the immediate future; and as the Eastbourne Rural District Council were out for business, they did not want to see a similar state of affairs in regard to them to what happened in the case of Pevensey and Westham, where the Gas Company held powers for 40 and 31 years respectively without exercising them.

Witness would not agree to an undertaking to supply in three years.

Mr. Lees then quoted figures tending to show how slight has been the development of the proposed districts during the past fourteen years.

Mr. *George Evetts* (Consulting Engineer to the Company) said they were seeking £50,000 new capital and £50,000 borrowing powers, making £100,000; and as the balance between the overspent capital and unexercised powers was £33,495, the total amount of new capital was £133,495. This alteration in the original application had necessitated a modification of the estimates of expenditure on new works, which were now as follows: Carbonizing plant and buildings, coal and coke handling plant and accessories, condensers, washers, and scrubbers, exhausters and boilers, purifiers, gasholders, tar and liquor wells, sulphate plant, tar plant and accessories, station meter, works connections, testing plant, and sundries, £53,500, as against £76,000 originally; mains and services, £45,350, as against £65,750; meters, £5400, as against £6000; and stoves and fires for ordinary consumers and complete coin-meter installations, £32,000, as against £36,000, making a total estimated expenditure of £136,250, instead of £183,750 as originally proposed. This plant would allow of an additional sale of 170,000,000 c.ft., the present amount being 537,000,000 c.ft. As to clause 22, dealing with the sliding-scale, he knew of cases in which the directors of gas companies had definitely refrained from making reductions in the price of gas in the early quarters of the year because of the fear that something might compel them to increase the price later, and then the shareholders lost all benefit over the whole year. This clause, he added, had been granted in the case of Truro and Hexham in 1922, and in the case of Ipswich this year; while it had been asked for in the Wolverhampton case, which was not yet decided, and also in the Gosport Order just filed. The Eastbourne Directors had been considering the matter for some years; and he regarded it as a natural development of the sliding-scale. The first development was from the year to the half-year; and so far as the industry was concerned, he had heard nothing against going from the half-year to the quarter. Referring again to the proposed capital expenditure, he said the Company were faced with the necessity for building a new retort-house. At present there was retort power for 1,800,000 c.ft. The maximum day was between 2,100,000 and 2,200,000 c.ft., and there was a considerable margin; but the water gas the Company were compelled to make was costing 8d. per therm, against 5d. per therm for the coal gas.

Witness agreed, in cross-examination, that at the moment the differential of 1d. in the outer districts would not pay. With regard the estimates, he had adopted an increase of 2½ p.ct. for the next 11 years, which he did not think unreasonable, having regard to the fact that, though the rate of increase during the past three years had only been about 1 p.ct., the rate during the current year was 5½ p.ct.

Mr. Pritchard suggested that, at the rate of expansion of the past three years, the Company would only require £70,000 or £80,000 new capital. He then mentioned clause 17, giving power to pay commissions for capital.

Mr. Honey: Don't waste time on that. It is coming out.

Mr. *Frank H. Jones* (Deputy-Chairman of the Company) was then called specially to give evidence as to the policy likely to be adopted. In cross-examination, he offered to undertake to give a supply as soon as the Directors could see a 5 p.ct. return on the mains to any district.

Mr. Lees said the Rural District Council wished to ensure that these districts would get a supply in a reasonable time, and the suggestion made by Mr. Jones was a fair one.

Witness, however, would not bind himself to any specified period, as Mr. Lees wished him to do.

The opponents did not call evidence, though Mr. Arthur Valon had been in the room earlier in the day advising the Corporation.

Mr. Pritchard then addressed the Director on the lines of his cross-examination, emphasizing the admission that had been made that the differential would not meet the cost in the first instance. His principal point, however, was as to the additional capital, and his argument, as put to Mr. Evetts, was that the present rate of increase in the sales did not justify any further capital powers being granted. He calculated that if the Company had the usual borrowing powers on the existing authorized capital, and issued the remaining unissued capital, they would have a sum of £83,000 available—more than would be required on the basis of 1¼ p.ct. increase, which was higher than the actual rate over the past three years. (The Company at present had an arbitrary amount of £37,500 borrowing powers); and he complained that they had not issued any loan capital.

Mr. Paddon said it would make a difference of only 1-10th of a penny per 1000 c.ft., if the loan capital had been issued.

Mr. Pritchard next mentioned the clause referring to the Corporation being supplied with a copy of the report sent to the Board of Trade, giving the results of auction sales.

Mr. Honey: Why do you want that?

Mr. Pritchard replied that the Corporation were looking after the interests of the consumers.

Mr. Honey: I really cannot give you that.

Mr. Pritchard then asked for a copy of the notice to the Justices before borrowing powers could be exercised.

Mr. Honey: I cannot give that either.

Mr. Pritchard argued that clause 22, modifying the sliding-scale to a quarterly basis, should not be granted, as the ordinary law was adequate.

Mr. Honey asked if the Corporation had any real objection to the quarterly sliding-scale.

Mr. Pritchard said it was felt that the ordinary sliding-scale was more favourable to the consumer, and that under the quarterly basis it might be possible so to arrange things that the dividend never came down. He said that the Corporation felt that it might be possible for the consumers to lose the benefit of the present sliding-scale by the possibility of the accounts being so adjusted on the quarterly system that the average price was kept up.

Mr. Honey said this was an important matter, and he wished to have it discussed. This alteration in the sliding-scale had been made in a number of cases. What had been very much in the mind of the Board of Trade was that it was hoped one could look forward to a period of falling prices, and that, broadly speaking, the price of gas was not going up but coming down. In these circumstances, gas companies ought to be encouraged to bring the price of gas down at the earliest possible moment, even in the middle of a half-year. As he understood it, the Eastbourne Company at present had no inducement to reduce the price of gas except on Jan. 1 in any year. Parliament had already recognized that the yearly sliding-scale should become a half-yearly one; and now that people were looking forward to a period in which they might reasonably hope for a gradual fall in costs, the Board did not think it unreasonable to make the sliding-scale quarterly instead of half-yearly, and so give gas companies some inducement to bring the price of gas down earlier than would otherwise be the case. This was the general argument for the quarterly sliding-scale at the moment, and he would like to know quite frankly what Mr. Pritchard thought about it.

Mr. Pritchard said that if they could be reasonably certain that prices were coming down, it would be different; but one heard on all hands that they had probably come to the end of the fall in prices—at any rate for many years to come.

Mr. Honey did not think they had come to the end of the fall in gas prices. He was looking at it from a different angle from that of the Secretary of the Company—viz., from the point of view of the consumer.

Mr. Pritchard said it was really a balance of probabilities, and he thought he could take it upon himself to say this on behalf of the Eastbourne Corporation. He did not think they had any very strong feeling with regard to the matter, but they were not convinced that the charge was warranted. At the same time, he might remark that the Corporation were prepared to leave the matter in the hands of the Director

Mr. Lees then addressed the Director on behalf of the Rural District Council.

Arising out of his speech, an arrangement was made between the parties that the Company should come under an obligation to supply in Eastdean and Levington in three years, and within five years in Folkington and Wilmington; the remaining six parishes being struck out of the Order.

XUM

NATIONAL GAS EXHIBITION ESSAY COMPETITIONS.

Lists of Prize Winners.

We have received for publication the following lists of prize winners in the highly successful series of competitions open to employees of gas undertakings that were arranged in connection with the recent National Gas Exhibition in Birmingham.

Open to all Employees of Gas Undertakings.

SECTION 1A.—*Write a short essay on "The Public Health Aspect of Gas Service."* (400 *words.*)

Adjudicator: Mr. W. M. Mason, British Commercial Gas Association.

1st. £2. Heron, A. T., Newcastle-upon-Tyne and Gateshead Gas Company.
2nd. £1. Hill, A., Birmingham Gas Department.
10s. Falkner, R. S., Sandown Gas Company (I.W.).
10s. Hodder, A., Stoke-on-Trent Gas Department.
10s. Rothwell, F., Reading Gas Company.
10s. Dunn, J. W., Manchester Gas Department.

SECTION 1B.—*Describe how you would plan a scheme for developing the sale of gas for each of the following: (a) Heating, (b) cooking, (c) hot water supply, (d) lighting, (e) wash boiler and irons, (f) power, (g) furnaces and other industrial appliances.* (600 *words.*)

Adjudicator: Mr. W. Gaskin, British Commercial Gas Association.

Consolation prize awarded.

10s. Armston, W. C., Earl Shilton Gas Light and Coke Company.

SECTION 1C.—*Describe what you consider to be the ideal gas showroom, with special reference to the plan and equipment of the interior.* (400 *words.*)

Adjudicator: Mr. W. Gaskin, British Commercial Gas Association.

First prize awarded only, and three consolation prizes.

1st. £2. Purcell, W. T., Stoke-on-Trent Gas Department.
10s. Burden, G. E., Redditch Gas Company.
5s. Taylor, B. W., Birmingham Gas Department.
5s. Smith, M. B., Birmingham Gas Department.

SECTION 1D.—*Give suggestions for window displays, dealing with each of the following: (a) Gas in the home, (b) gas for cooking, (c) gas for heating, (d) gas for hot water supply, (e) gas for lighting, (f) gas for power and industrial purposes.* (600 *words.*)

Adjudicator: Mr. W. Gaskin, British Commercial Gas Association.

Two entries.—Prize not awarded.

Open to Superintendents, Foremen, and District Inspectors.

SECTION 2.—*Write a short essay on "The Principles I would follow in the Organization and Supervision of Labour."* (300 *words.*)

Adjudicator: Mr. W. Gaskin, British Commercial Gas Association.

First and second prizes not awarded. Consolation prizes awarded as follows:

£1. Hill, A., Birmingham Gas Department.
10s. Simmons, S. W., Dudley Gas Department.
10s. Percy, H., Birmingham Gas Department.
10s. Wakerell, A., Berkhampstead.

Open to Gas Fitters and Assistants.

SECTION 3A.—*You are given an order to fix a gas-heated circulator in a house where the hot water supply is heated by kitchen range. Describe how you would handle the job from start to finish, giving a sketch of the boiler and connections.* (300 *words.*)

Adjudicator: Mr. F. W. Dye, Messrs. John Wright & Co.

1st. £3. Goodrick, J., Halifax Gas Department.
2nd. £2. Fieldhouse, A., West Bromwich Gas Department.
3rd. £1. Taylor, G., Gas Light and Coke Company, London.
10s. Young, P. R., Dover Gas Company.
10s. Cooper, H., Blackburn Gas Department.
10s. Woodland, C. R., Exeter Gas Company.
10s. Rothwell, F., Reading Gas Company.
5s. Hamer, W. C., Wolverhampton Gas Company.
5s. Latham, A., Birmingham Gas Department.
5s. Price, C. S., Wolverhampton Gas Company.
5s. Boldero, G., Cromer Gas Company.
5s. Johnson, F., Scarborough Gas Company.
5s. Day, F., Reading Gas Company.
5s. Corless, R., Blackburn Gas Department.
5s. Finch, R. C., Gas Light and Coke Company, London.

Additional prize of 10s. Bottomley, H., British Gas Light Company, Hull.

SECTION 3B.—*You are given an order to fix a gas-fire in lieu of a coal fire. Describe how you would handle the job from start to finish.* (300 *words.*)

Adjudicator: Mr. W. J. Sandeman, Distributing Engineer and Sales Manager, Croydon Gas Company.

1st. £3. Bowd, W. J., Wandsworth, Wimbledon, and Epsom District Gas Company.
2nd. £2. Cottle, E. A., Birmingham Gas Department.
3rd. £1. Hadley, L., Birmingham Gas Department.
10s. Higginson, O. J., Birmingham Gas Department.
10s. Clarke, M., Gas Light and Coke Company, London.
10s. Timmins, G., Birmingham Gas Department.
10s. Peel, John, Hyde Gas Company.
5s. Wardle, F., Tipton Urban District Council.
5s. Newman, W., Ipswich Gas Light Company.
5s. Bradley, W., West Bromwich Gas Department.
5s. Stokes, A., Birmingham Gas Department.
5s. Bishop, A. S. G., Gas Light and Coke Company, London.
5s. Smith, W. B., Birmingham Gas Department (Wednesbury).
5s. Sweetman, F., Sandown Gas Company (I.W.).
5s. Bell, G. H., Gas Light and Coke Company, London.

Open to Storekeepers.

Answer one question only.

SECTION 4.—*Describe and give a rough sketch plan of what is, in your opinion, the ideal stores, having regard particularly to facilities for the storing, handling, and issuing of material in case of (a) distribution and fitting stores, (b) gas-works and general stores.* (300 *words.*)

Adjudicator: Mr. W. Gaskin, British Commercial Gas Association.

1st and 2nd prizes only awarded.

1st. £2. Sidney F., South Shields Gas Company.
2nd. £1. Duncombe, E. L. Gas Light and Coke Company.

Open to Clerical Staff.

SECTION 5.—*Write an essay in concise form on "Scientific Costing in the Gas Industry."*

Adjudicator: Mr. E. Cooke, late Accountant, City of Birmingham, Gas Department.

1st and 3rd prizes only awarded.

1st. £3. Baker, C. F. Birmingham Gas Department, Nechells Works.
3rd. £1. Robinson, G., South Shields Gas Company.

Open to Juniors, all grades, under 20 years of age.

SECTION 6.—*Write an essay on: "My Plans for a Successful Career in the Gas Industry."* (300 *words.*)

Adjudicator: Mr. F. W. Goodenough, Executive Chairman, British Commercial Gas Association.

Tie—1st & 2nd. £2 10s. Dand, F. V. M., Gas Light and Coke Company, London.
2nd. £2 10s. Mann, W. J., Gas Light and Coke Company, London.
3rd. £1. Gwilliam, G. O., Stourbridge Gas Department.

Open to Chemists.

SECTION 7A.—*Give a percentage volumetric analysis of the gas you consider most economical to produce and consume, together with your reasons from each point of view.* (400 *words.*)

Adjudicator: Dr. E. W. Smith.

1st. £3. Marsden, A., Bristol Gas Company.
2nd. £2. Myhill, A. R., Birmingham Gas Department.
3rd. £1. Cheeseman, S., Gas Light and Coke Company, London.
10s. Warr, R. G., Birmingham Gas Department.
10s. Butt, F. A., Torquay and Paignton Gas Company.
10s. Clarke, B., Long Eaton Gas Company.
10s. Mepham, L. W. (Works not stated. Address, Portslade.)
5s. Phillips, C. J., Southampton Gas Light and Coke Company.
5s. Makin, H. S., Smethwick Gas Department.

SECTION 7B.—*Describe a satisfactory process for making neutral dry sulphate of ammonia from gas liquor, giving essential data as regards composition, quantities, &c., of gas liquor, steam, lime, sulphuric acid, waste liquor, and the neutral dry sulphate of ammonia. For what reasons is it preferable to make the above quality of sulphate instead of the ordinary sulphate?* (600 *words.*)

Adjudicator: Mr. T. F. E. Rhead, Chief Chemist, Birmingham Gas Department.

1st. £3. Hailstone, H. J., Rochdale Gas Department.
2nd. £2. Thorpe, B., Huddersfield Gas Department.
3rd. 10s. Pepper, R. J., Gas Light and Coke Company, London.
5s. Allen, O., Bedford Gas Light Company.
5s. Sturrock, R., Dalmarnock Gas-Works.
5s. Hawkins, F. H., Birmingham Gas Department.

Open to Engineers' Assistants and Junior Technical Assistants.

Answer one question only.

SECTIONS 8A and B.—(*A*) *Contrast concisely the advantages of various sources of power for gas-works machinery* (400 *words*), *or* (*B*) *Briefly describe what you consider the most useful instruments of recent invention for giving better scientific control of works operations.* (400 *words.*)

Adjudicator: Mr. P. N. Langford, Engineer and Manager, Coventry Gas Department.

1st. £3. Hawthorn, S. K., Birmingham Gas Department.
2nd. £2. Davies, E., Beckton Gas-Works.
3rd. £1. Clarke, B., Long Eaton Gas Company.
4th. 10s. Huartson, H., Birmingham Gas Department.
5s. Greaves, R. L., Shrewsbury Gas Light Company.

Open to Gas-Works Foremen and Employees.

SECTION 9.—*State from your experience the particular lines upon which inventors should work in order to eliminate waste on gas-works.* (400 *words.*)

Adjudicator: Mr. P. N. Langford, of Coventry.

5s. Cox, W. J., Bristol Gas Company.
5s. Philpott, P. J., Redditch Gas Company.

Open to Meter Inspectors.

SECTION 10.—*Describe briefly how you would point out to the consumers in your district the advantages of the therm system of charging for gas.* (300 *words.*)

Adjudicator: Mr. W. E. Caton, General Manager and Engineer, Oxford Gas Light and Coke Company.

1st. £3. Rawnsley, W. E., Yeadon and Guiseley Gas Company.
2nd. £2. Hickman, P. G., South Metropolitan Gas Company.
3rd. £1. Banks, G. E., Sheffield Gas Company.
10s. Filer, F. A. R., Ryde Gaslight Company.
10s. Clarke, R. J., Long Eaton Gas Company.
10s. Pilgrim, E. S. T., Bristol Gas Company.
10s. Racklyeft, G., Long Eaton Gas Company.
5s. Whitehead, H., Rochdale Gas Department.
5s. Cope, Chas., Birmingham Gas Department.
5s. Le Jeune, E.C., South Metropolitan Gas Company.
5s. Noon, F. C., Birmingham Gas Department.

SULPHATE OF AMMONIA POOLING ACCOUNTS.

The action of the *British Sulphate of Ammonia Federation, Ltd., v. South Metropolitan Gas Company* was in the list for trial before Mr Justice Greer on Thursday last.

Mr. Wright, K.C. (with him Mr. Jowitt, K.C., and Mr. Le Quesne), for plaintiffs, said the action was of a complicated and difficult character, relating to the proper method of keeping accounts in a pooling and prices equalization system, which was adopted in consequence of the war. His learned friends who appeared for the defendants and the plaintiff's Counsel had carefully considered the matter; and it was thought that, if the case was allowed to stand over until Wednesday, the whole action might be disposed of, by being referred to two eminent accountants, who could deal with it on certain principles which the parties had assented to without prejudice to the evidence. In the circumstances, he asked that the case should stand over till Wednesday, when they had every hope of success in the course proposed to be adopted.

Mr. Raeburn, K.C. (who, with Sir John Simon, K.C., and Mr. J. Wylie, appeared for the defendants), concurred in the application.

His Lordship ordered the case to stand over till the day mentioned.

PRICE REDUCTIONS IN ALDERSHOT DISTRICT.

From the following statement of the prices of gas operating in the various districts of the Aldershot Gas, Water, and District Lighting Company's statutory area, it will be observed that the net result is that the charge has been reduced in the "A" area by 28·7 p.ct., in the "B" area by 30·2 p.ct., and in the "C" and "D" areas by 28 2 p.ct.

From—	"A" Area, Pence per Therm.	"B" Area, Pence per Therm.	"C" & "D" Areas, Pence per Therm.
	s. d.	s. d.	s. d.
April 1, 1921 . . (450 B.Th.U.)	1 4	1 5½	1 6¾
July 1, 1921. . . (500 ,,)	1 3¾	1 4½	1 6
Christmas, 1921 . (,, ,,)	1 3	1 4⅛	1 5⅜
July 1, 1922. . . (,, ,,)	1 3	1 3⅜	1 5⅛
Jan. 1, 1923 . . (,, ,,)	1 1	1 1⅜	1 3⅝
April 1, 1923 . . (,, ,,)	0 11⅛	1 0⅜	1 1⅜
July 1, 1923 . . (510 ,,)	0 11⅜	1 0	1 1⅛
Decrease	28 7 p.ct.	30·2 p.ct.	28·2 p.ct.

TRADE NOTES.

"Becco-Legg" Filters.

The Becco Engineering and Chemical Company, Ltd., of Nos. 158-160, City Road, E.C. 1, have recently published in pamphlet form a description of their various systems of water filtration and purification. The pressure and gravity filters are lucidly explained in a scientific manner. In cases where there is a risk of the filters being overworked, the clear water can be completely sterilized by the addition of liquid chloric applied accurately to the water by the "Legg-Bawtree" patent chlorinator. Mention is made of the "Becco-Legg" automatic continuous water softening and filtration plant; attention being drawn to the benefit which can be conferred on a community by softening excessively hard water supplies.

Cheaper Gas at Boston [Lincs.].

The Boston (Lincs.) Gas Light and Coke Company, in intimating that as from Nov. 1 they will supply gas of a calorific value of 460 B.Th.U., state that they have fixed the price of 1s. 1d. per therm for gas to be supplied to ordinary and engine consumers from that date, and for slot consumers from the December collection, subject in the case of the ordinary consumers to a discount of 10 p.ct. and in the case of engine consumers to a discount of 20 p.ct., provided the accounts are paid within the specified periods. The Directors draw the attention of all consumers to the fact that these charges represent a total reduction equivalent to 7¼d. per 1000 c.ft. since May last. On the basis named, the prices will be:

	Per Therm.		Per 1000 C. Ft. Net.
	Gross.	Net.	
	s. d.	d.	s. d.
Engine consumers	1 1	10·4	3 11¾
Ordinary consumers	1 1	11·7	4 5¾
Slot-meter consumers	—	13·8	5 3¾

In the case of ordinary consumers, the rate is 5·3d. per therm, or 2s. per 1000 c.ft., and in the case of engine consumers it is 6·6d. per therm, or 2s. 6d. per 1000 c.ft., less than the maximum price fixed by the Order.

Blackpool Gas-Works Inspected.—On Oct. 18, members of the Blackpool Gas Committee made a detailed inspection of the works. The local consumption of gas is still on the increase, the return for the last month showing an advance of 9·79 p.ct. on last year. During the summer months the demand was so great that it was necessary to instal additional plant. The Committee have accepted tenders for the supply of condensers and boosting plant. Large mains will be laid direct to Whitegate Drive, which will be available for tapping *en route* as required. Mr. John H. Chew, Deputy Engineer and Manager, has had charge since the death of Mr. Wm. Chew. It has now been decided to advertise for a Gas Manager at a salary of £800 a year.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The market finished up the week with a very firm tone. At one time there appeared to be some alarm at the developments in the German situation, and especially at the strikes in Hamburg and Bremen; but, though definite news is hard to obtain, it seems that some sort of a settlement has been arrived at. And so the coal market situation remains more or less unchanged—buyers unwilling to commit themselves far, speculatively or otherwise, at present prices, and sellers, adding odd contracts here and there for next year, still maintaining their quotations.

Though there has not been very much doing in gas coal, there has been no weakening in best Durham unscreened, owing to the large inquiry for coking coals for next year. Chief interest during the week has again been in these, and they have been sold for the first six months of next year at prices up to 24s., according to quality. This has enabled the collieries to maintain the quotation for specials and best qualities of gas (Holmside Boldar, New Pelton class) at this figure. Second-class qualities, however, cannot be said to be so firm on the week, and find it hard to maintain a 22s. to 23s. price.

Business is very difficult in the present uncertain circumstances. Pitters seem to have fixed in their minds a 23s. to 24s. basis for best qualities for next year, and have probably in most cases quickly taken on a fair amount of business at about 23s. 6d. They are not by any means anxious to fill up at these figures. The unexpected run-away in prices in the spring of this year caught too many of them short of free coal, and they maintain that, as things are now, anything might happen next year.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

The mildness of the weather has contributed largely to the decrease in house coal orders; but collieries report that the better brands are not in stock, although the secondary qualities are marketing slowly. Gas coals, as previously mentioned, have been sold up to the beginning of next summer. There are a few orders still to place; but the commoner qualities are affecting the market to some degree. There is a decided decrease in the demand for industrial coal, although prices have not altered to any great extent. The outlook at the moment is principally with the Ruhr position, and a settlement of this—as to the resultant extension in the coal trade—is rather problematical. It will, of course, take some months after a settlement has been effected before the coal trade assumes something like normal conditions. The export section is rather quieter, principally owing to the uncertainty which prevails between exporters on the one side and foreign consumers on the other. The rates of exchange are unnaturally high, and the October shipments will probably be very much lower than those of last month. There is a tendency to sell spot lots for immediate payment, which makes business more difficult. It remains to be seen whether this mode of procedure will continue.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

A good deal of confusion is arising from the forwarding of coal supplies to some of the gas-works in excess of their consumptive requirements and storage capacity. Considerable numbers of privately-owned wagons are standing in sidings waiting to be unloaded. This threatens complications, apart from the congestion, as undertakings which have wagons of their own adequate for current needs will not be prepared to pay hire for superfluous stock. The demand for best household grades has slowed down. The decline tends to emphasize the weakness of the position in regard to gas coal, which is being offered at prices materially below those applying to yearly contracts. The output of beans and D.S. nuts is being regularly absorbed now; a brisker export demand being responsible for the tightening-up. Surplus slacks have been cleared for the most part, the deterioration of prices being arrested.

Blast-furnace owners reiterate the demand for a further lowering of coke prices. The more active inquiry that has sprung up for pig iron, and in which the Midland furnaces are now participating, strengthens the hands of coke suppliers, promising the reversal of recent retrogression. The decisive factor, however, is the Continental demand.

Paying for Electricity They Do Not Get.—Now that Skipton have got electricity, after many weary months of waiting and negotiation with outside supply authorities, the people who are not using the current are objecting to being levied a 3d. rate to meet the estimated deficit of £700 on the first year's working of the undertaking. At a recent Council meeting there was a petition signed by 196 ratepayers, chiefly in districts where cables are not laid, and therefore where the people cannot have electricity even if they want it. The Clerk pointed out that the price of 8d. per unit cannot be increased except by consent of the Board of Trade, and consequently they cannot look to such a way of meeting the deficit. The proposed rate was approved.

Meter Testing in Edinburgh.—It appears from the report of Mr. William Gordon (the Official Inspector of Gas-Meters for the city) that the number of gas-meters tested and examined by the Edinburgh Gas-Meter Testing Department during the twelve months ended May 15 last was 81,006, of which 2530 were wet. Fees totalling £4378 6s. 6d. were collected. Compared with the preceding twelve months, these figures show an increase of 7734 meters and £467 in fees. There are at present seven testing stations under the jurisdiction of the Edinburgh Local Authority; and during the year, sanction was given to the equipment of a new station at Beaverhall, Broughton Road. There was a profit on the year's work of £1444. Of the 78,476 dry meters tested, 1·86 p.ct. were rejected as incorrect, and of the 2530 wet meters, 0·43 p.ct.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Oct.* 29.

The demand for pitch continues active, and prices maintain a firm tone; the present market value being about 140s. to 142s. 6d. per ton. Creosote is steady at about 9¾d. per gallon net in bulk. Tar spirits remain without particular change; solvent naphtha being quoted at about 1s. 6d. per gallon for 95-160 quality, pure toluole about 1s. 9d. to 1s. 10d. per gallon, and pure benzole about 1s. 7d. to 1s. 8d. per gallon. Other products are without change.

Tar Products in the Provinces.

Oct. 29.

The market for tar products has remained firm throughout the past week. There has been a little more inquiry for pitch both for the prompt and forward positions; but prices remain about the same. Creosote is in fair demand, both for prompt and forward delivery.

The average values for gas-works products during last week were: Gas-works coal tar, 79s. to 84s. Pitch, East Coast, 135s. to 137s. 6d. f.o.b. West Coast—Manchester, 130s. to 132s. 6d.; Liverpool, 131s. to 133s. 6d.; Clyde, 132s. to 135s. Benzole 90 p.ct., North, 1s. 0½d. to 1s. 1d.; crude 65 p.ct. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 5d. to 1s. 7d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 4d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8¼d.; salty, 7½d. to 8d.; Scotland, 6¾d. to 7¼d. Heavy oils, in bulk, North, 8¼d. to 9d. Carbolic acid, 60 p.ct., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Sir William Kay on Gas Profits.—Addressing the local branch of the "Y.M.C.A." Sir William Kay (the Chairman of the Manchester Gas Committee) said the ratepayers of Manchester had had three-and-a-half millions of profit out of the gas undertaking, but there was nothing to show for this money. He had long held the view, and would continue to do so, that 200,000 people should not pay a copper or two per 1000 c.ft. in order to make a profit that would bolster-up some other undertaking. In the Belfast City Hall there was a brass plate stating that the building came out of such profits; but in Manchester the money had gone, and not one improvement could be traced to it. He hoped to live to see the day, not far distant, perhaps, when the gas in Manchester would be somewhere near 2s. per 1000 c.ft.

Hinckley Gas Exhibition.—Promoted by the Hinckley Urban District Council, who own and control the local gas-works, a most successful gas exhibition was held last week in the Baths Hall at Hinckley. All the latest appliances connected with the gas industry were on view, and a notable feature consisted of six compartments in colours illustrating the effect of a certain light on "radiating" colours and otherwise. The arrangements were such as to do great credit to Mr. Fred. Lee (the Gas Manager); the exhibition being described as one of the best ever seen in this country for a town the size of Hinckley. At the opening, Mr. W. H. Bott, J.P., C.C. (the Chairman of the Gas Committee), referred to the extraordinary progress made by the gas-works in recent years, and said that since they were taken over by the Hinckley Local Board from a private Company in 1882, the yearly output had increased from 15,847,000 to 143,111,400 c.ft. Notwithstanding that huge sums had been spent on additions, the total debt on the works was only £10,200. New vertical retorts had recently been introduced at a cost of over £30,000; but rather than increasing the charge, consumers would be glad to know that the economies which would be effected would probably result in a cheapening of the price of gas sooner than they had anticipated.

Mr. J. Wilfrid Drake, head of the firm of Messrs. Drakes, Ltd., gas constructional engineers, of Halifax, has given a silver trophy for the local mixed-voice choirs class in the Halifax Competitive Musical Festival.

The Welshpool Town Council on Friday declined to support an application of the Welshpool Gas Company to the Electricity Commissioners for an Order to undertake an electricity scheme, and decided to apply for an Order themselves.

The Thornton Town Council have received sanction to borrow £2000 for additional lengths of gas-mains in public highways (unemployment scheme), £1000 for prospective expenditure on mains, &c., and £1000 for gas-works extension and plant.

The Directors of Meters Ltd. have declared the following on account of the dividends for the current year: On the preference shares at the rate of 5½ p.ct. per annum; and on the ordinary shares at the rate of 5 p.ct. per annum. Warrants will be posted on Nov. 14.

The Huddersfield Gas Committee have agreed to pay the fees of any members of the gas undertaking staff who, with the approval of the Gas Engineer, are prepared to attend a course of lectures being given during the winter, at the Huddersfield Technical College, on smoke abatement and fuel economy.

The Plymouth Corporation Gas Committee on Thursday last decided to make application to the Ministry of Health for sanction to borrow £15,000 for the laying of new mains in the Devonport area. With regard to the output of gas, the statement for the month of September showed an increase of 6·44 p.ct. over the corresponding month of last year.

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STOCK MARKET REPORT.

The Stock Markets were unsettled during the week by reason of the chaotic condition in the Rhineland and by the weakness of the exchanges. The persistent rumour of an "inflation" policy was also a disturbing factor. The Prime Minister, endorsing the previous statements of his two colleagues, emphatically denied, on Thursday, that any change of policy was contemplated. This announcement, which should dissipate the fears of nervous foreign holders of sterling balances, had an excellent effect on the stock markets, and Home Government stocks rallied at the end of the week. Foreign Government bonds were irregular; but the strength of the recently issued Colonial scrips was an outstanding feature. South Africans continued in favour, and Oil shares were greatly in demand. Rubbers and Teas were weak.

The feature of the Gas Market was a further rise in the Wandsworth "A" stock. Other gas stocks were well supported.

Compared with the previous week, changes in gas companies' quotations were as follows: In the London and Suburban group, Gas Light ordinary dropped ½, South Metropolitan ordinary were ½ higher, Croydon sliding-scale rose 1, Croydon maximum dividend 3½, South Suburban 5 p.ct. debenture gained 2, and Wandsworth "A" 5. In Provincials, Bournemouth 5 p.ct. rose ½, Bournemouth 6 p.ct. preference ½, Brighton and Hove 3, Maidstone 5 p.ct. 36, Maidstone 3 p.ct. debenture 3, Newcastle and Gateshead advanced 1½, and Southampton 4 p.ct. debenture 1. Among the foreign companies, Hong Kong and China rose ½ and Continental Union preference 3; while Primitiva 5 p.ct. preference were marked down 1/16.

The following transactions were recorded on the London Stock Exchange during the week. On Monday, Alliance and Dublin 71½, 71½, 72, Bournemouth 5 p.ct. converted 12½, "B" 7 p.ct. maximum 12⅝, 12¾, 6 p.ct. preference 10⅝, Brentford "A" consolidated 102⅛, 102⅜, 103, "B" consolidated 102, Brighton and Hove 177, 178, Commercial 4 p.ct. 96½, 97, Croydon maximum dividend 85, 85⅛, European 8⅞, Gas Light and Coke 95⅛, 95⅛, 96, 96⅛, 96⅜, 96½, 3½ p.ct. maximum 66, 4 p.ct. consolidated preference 81¼, 3 p.ct. consolidated debenture 62½, 62⅝, Hong Kong and China 16 *ex* div., Imperial Continental 157½, 158½, Newcastle and Gateshead 3½ p.ct. 85, Primitiva 5s. 6d., 6s. 3d., 6s. 6d., 5 p.ct. preference 27s. 6d., South Metropolitan 99, 99¼, 99⅛, South Suburban 5 p.ct. 101½, Swansea 6⅛ p.ct. debenture 106¾, Tottenham "B" consolidated 104, Wandsworth "B" 120, 120½. Supplementary prices, British Gas Light 123, Colombo 11⅜⅛, 12. On Tuesday, Brentford "A" consolidated 102⅛, 103, Brighton and Hove "A" consolidated 130½, British 126, Commercial 4 p.ct. 95¼, Continental Union 32, Gas Light and Coke 4 p.ct. 95½, 95⅝, 95¾, 96¼, 3½ p.ct. maximum 66⅛, 4 p.ct. consolidated preference 81⅛, 3 p.ct. consolidated debenture 63½, Imperial Continental 157, Primitiva 5 p.ct. preference 27s., 27s. 6d., South Metropolitan 98⅜, 98⅞, 99, 3 p.ct. debenture 62, South Suburban 5 p.ct. debenture 99, 101½, Wandsworth "A" 5 p.ct. 136½, 3 p.ct. debenture 57⅛. Supplementary prices, Bournemouth 7 p.ct. debenture 105, Brighton and Hove 6 p.ct. "B" preference consolidated 106. On Wednesday, Alliance and Dublin 70½, Bristol 5 p.ct. maximum 90½, 91, British Gas Light 125, Cape Town and District 4½ p.ct. preference 6⅜, 6¾, Commercial 3½ p.ct. 95, 3 p.ct. debenture 60, Continental Union 30, 31, 32, Croydon sliding-scale 103, 104, maximum dividend, 85⅛, 86, European 8½, Gas Light and Coke 95⅜, 95⅝, 96, 96¼, 96⅜, 3 p.ct. consolidated debenture 63, Imperial Continental 157, Primitiva 6s., 5 p.ct. preference 27s., South Metropolitan 98½, 98⅝, 99⅛, 3 p.ct. debenture 62⅜, South Suburban 5 p.ct. 101, Southampton 4 p.ct. debenture 79, 79⅛, Wandsworth "B" 119, 120, 120½. Supplementary prices, Bournemouth 7 p.ct. debenture 107. On Thursday, Alliance and Dublin 70, Bombay 5⅜ *ex* div., Commercial 4 p.ct. 95⅝, 96, 96⅛, Gas Light and Coke 95, 95¼, 95⅜, 95⅛, 95⅝, 96, 3½ p.ct. maximum 66, 4 p.ct. consolidated preference 80⅜, Imperial Continental 155, 157, Primitiva 6s. 6d., 4 p.ct. (River Plate) debenture 56⅜, South Metropolitan 98⅝, 99⅛. On Friday, Brentford "B" consolidated 103, Brighton and Hove original 177, British Gas Light 124, 7 p.ct. preference 120½, Commercial 3½ p.ct. 96⅜ European 8½, Gas Light and Coke 95⅛, 95⅜, 95 13/16, 95⅝, 96, 3½ p.ct. maximum 66, 4 p.ct. consolidated preference 81¼, Imperial Continental 155, Primitiva 6s. 3d., 5 p.ct. preference 27s., 4 p.ct. (River Plate) debenture 57½, South Metropolitan 3 p.ct. debenture 63, South Suburban 5 p.ct. 101½, Wandsworth 3 p.ct. debenture 60. Supplementary prices, Gas Light and Coke 10 p.ct. Bonds 195.

In the Foreign Exchange market interest was largely centred in the dollar-sterling exchange, which, in spite of a sharp rally on Friday, fell on the week from $4.52⅜ c. to $4.48⅜ c. French and Belgian francs and Italian lire weakened.

In the Money Market rates were easier at the beginning of the week, and balances were offered at 1½ p.ct.; but rates hardened as the week progressed, and, in spite of a plentiful supply, 2½ p.ct. was the usual charge for overnight accommodation. Deposit rates were 2 p.ct. at call and 2¼ p.ct. at notice.

Silver showed an improvement on the week from 31⅛d. to 31 1/16d. per oz.

The Bank of England rate remains at 4 p.ct., to which figure it was raised from 3 p.ct. on July 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Quotations, Oct. 26.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Aug. 9	—	5	Aldershot 5 p.c. max. C.	..	72—77	...
217,992	,,	,,	4	4	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Oct. 4	4	5½	Alliance & Dublin Ord.	59—64	68—73	70—72
374,000	,,	July 12	4	4	Do. 4 p.c. Deb.	76—79	62—67	..
280,000	5	Oct. 18	6	6	Bombay, Ltd.	5⅛—6⅛	5⅜—5⅝*	5⅜*
100,000	10	Aug. 9	16	8½	Bournemouth Gas and Water { 5 p.c.	..	12½—13½	12½
383,110	10	,,	7	7	Bournemouth Gas and Water { B 7 p.c.	15—15½	11½—12½	12⅛—12⅜
115,000	10	,,	6	6	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	11—12	10½
162,025	—	June 28	—	4	Bournemouth Gas and Water { 4 p.c. Deb.	..	77—82	..
992,045	Stk.	July 12	14	5 3/16	Brentford A Consolid.	261—266	100—103	102½—103
734,920	,,	,,	11	6½	Do. B New	204—209	100—103	102
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	90—95	...
221,400	,,	June 14	4	4	Do. 4 p.c. Deb.	91—93	77—82	...
214,745	,,	Aug. 23	11	11½	Brighton & Hove Orig.	208—213	175—178	177—178
244,200	,,	,,	8	8½	Do. A Ord. Stk.	154—159	127—132	130½
1,287,300	Stk.	July 26	5	5	Bristol 5 p.c. max.	..	95—96 B.	90½—91
570,000	20	Oct. 4	12½	12	British A Ord.	44—45	123—128	124—126
100,000	10	June 28	—	7	Do. 7 p.c. Pref.	..	120—125	120½
120,000	Stk.	,,	4	4	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
100,000	10	May 17	—	7	Cape Town & Dis., Ltd.	1½—2½	7—8	...
100,000	10	May 3	—	4½	Do. 4½ p.c. Pref.	4—6	6—7	6⅞—6⅞
150,000	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	75—80	...
237,860	,,	,,	—	7½	Cardiff 7½ p.c. Deb.	..	106—111	...
157,150	,,	Feb. 26	7	5	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 25	5/9/4	6	Commercial 4 p.c. Stk.	106—108	95—98	95⅞—97
560,000	,,	,,	5½	6	Do. 3½ p.c. do.	103—105	93—98	95—96⅛
475,000	,,	June 14	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	60—64	60
800,000	,,	14 Jan. 15	4	—	Continental Union, Ltd.	76—79	28—33	30—32
200,000	,,	Dec. 14	7	4	Do. 7 p.c. Pref.	115—118	75—80	...
660,000		Aug. 9	—	6½	Croydon sliding scale.	..	102—105	103—104
284,975		,,	—	5	Do. max. div.	..	85—88	85—86
492,270	Stk.	,,	6	4½	Derby Con. Stk.	123—125	110—112	110
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	74—76	75
209,000	,,	Oct. 4	—	5	East Hull 5 p.c. max.	..	..	...
1,002,180	10	July 12	10	5	European, Ltd.	17⅛—18	8—9	8⅛—8⅝
16,346,120	Stk.	July 26	4/17/4	5⅜	Gas Light and Coke { 4 p.c. Ord.	98—102	95—97	95—96⅛
2,600,000	,,	,,	3½	3½	Gas Light and Coke { 3½ p.c. max.	76—79	65—68	66—66⅛
4,062,235	,,	,,	4	4	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	80—83	80⅛—81⅛
4,761,930	,,	June 14	3	3	Gas Light and Coke { 3 p.c. Con. Deb.	72½—74½	61—64	62½—63⅜
130,000	,,	Dec. 11	10	10	Gas Light and Coke { 10 p.c. Bonds	..	..	195
42,000	—	—	—	7½	Do. 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Sept. 19	5	6⅔	Hastings & St. L. 5 p.c.	..	93—98	...
258,740	,,	,,	3½	5⅔	Do. 3½ p.c.	87—89	78—83	...
70,000	10	Oct. 18	11	10	Hongkong & China, Ltd.	16½—16¾	15½—16⅛*	16*
86,600	Stk.	Aug. 23	9	9½	Hornsey 7 p.c.	..	144—149	...
1,976,000	,,	May 31	9	17	Imperial Continental	150—160	155—160	155—158½
401,400	,,	Aug. 9	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	76—78	...
235,242	,,	,,	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,127,240	,,	Feb. 26	10	5⅛	Liverpool 5 p.c. Ord.	—	..	...
600,000	,,	Sept. 19	—	7	,, 7 p.c. Pref.	..	104—107	...
165,736	,,	Aug. 23	7/5/6	9	Maidstone 5 p.c.	—	140—145	...
63,480	,,	June 28	—	—	Do. 3 p.c. Deb	..	53—60	...
75,000	5	June 14	6	7	Malta & Mediterranean Mst. of Melbourne { 4½ p.c. Deb.	4⅛—4⅜	3¾—4	...
50,000	100	Oct. 1	4½	4½		99—101	95—98*	...
541,920	Stk.	May 17	4	4	Montevideo, Ltd.	11½—12	49—54	...
1,875,892	,,	July 26	4½	4½	Newcastle & Gatsh'dCon.	98½—99½	85—85½N.	85—85⅛
250,166	,,	Aug. 9	—	4	Do. 4 p.c. Pref. Stk.	..	74½—76½N.	...
329,705	,,	June 28	—	3½	Do. 3½ p.c. Deb.	82—83	71—73 N.	...
15,000	10	Aug. 23	—	11	North Middlesex 10 p.c.	..	16½—17½	...
75,940	10	,,	7/14/0	7 7/16	,, ,, 7 p.c.	14—15	11⅜—12⅜	...
300,000	Stk.	May 3	8	7	Oriental, Ltd.	117—122	97—102	...
138,120	Stk.	June 28	—	7½	Plym'th & Stonh'se 5 p.c.	..	108—113	...
60,000	50	Sept. 6	13	13	Portsea Island, B	128—131	100—105	...
100,000	50		12	12	Do. C	118—121	97—102	...
2,450,345	5	29 Oct. 14	8	—	Primitiva Ord.	5⅛—6	½—¾	5/6—6/6
2,499,800	5	30 Dec. 15	5	—	Do. 5 p.c. Pref.	4⅜—5	1 1/16—1 3/16	27/—27/6
341,400	100	June 1	4	4	Do. 4 p.c. Deb.	91—93	70—74	...
600,000	Stk.	July 26	4	4	Do. ,, ,, 1911	..	56—59	...
220,835	,,	June 28	4	4	Do. B. Aires 4 p.c. Deb.	85—87	56—59	...
321,670	,,	,,	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	56—59	56¼—57⅛
130,000	10	Oct. 4	6	6	San Paulo { 6 p.c. Pref.	10½—11	5¼—6	...
125,000	50	July 2	5	5	San Paulo { 5 p.c. Deb.	47—49	38—41	...
270,000	Stk.	Aug. 23	10	5	Sheffield A	223—224	99—10 S.	...
419,968	,,	,,	10	5	Do. B	223—224	99—101S.	...
1,047,000	,,	,,	10	5	Do. C	220—222	99—101S.	...
133,201	Stk.	—	4	6	Shrewsbury 5 p.c.	..	..	...
90,000	10	Oct. 18	9	6	South African	10½—11½	7—9*	...
6,609,895	Stk.	July 26	5/9/4	5	South Met. Ord.	111—113	98—100	98½—99½
250,000	,,	July 12	—	5	Do. Red. Pref.	..	98—100	...
1,895,445	,,	,,	3	3	Do. 3 p.c. Deb.	72½—74½	61—64	62—63
734,000	,,	Sept. 6	—	6½	Do. 6½ p.c. Deb.	..	105—107	...
91,500	,,	Aug. 23	8½	8½	South Shields Con. Stk.	157—159	134—136N.	...
1,087,795	,,	,,	6	6	S'th Suburb'n Ord. 5 p.c.	114—116	100—103	101—101½
368,837	,,	June 28	5	5	Do. 5 p.c. Deb. Stk.	116—118	97—102	99—101½
647,740	,,	May 3	5	7	S'th'mpt'n Ord. 5p.c. max	99—102	88—91	...
121,275	,,	June 28	4	4	Do. 4 p.c. Deb. Stk.	..	76—81	79—79½
350,000	,,	Aug. 23	—	7	Swansea 7 p.c. Pref. Stk.	..	103—104	...
200,000	,,	June 28	—	6½	Do. 6½ p.c. Deb. Stk.	..	105—107	106½
120,000	,,	July 26	—	8	Tottenham District { A 5 p.c.	135—138	122—127	...
782,275	,,	,,	6	6½	Tottenham District { B 3½ p.c.	115—117	100—105	104
181,255	,,	June 14	4	4	Tottenham District { 4 p.c. Deb.	87—89	78—82	...
258,251	Stk.	Aug. 23	5	5	Tynemouth 5 p.c. max.	108½—109	88—90 N.	...
30,000	..	July 12	8½	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	131—136	140—145	136½
255,636	,,	,,	6½	7½	Do. B 3½ p.c.	129—134	116—121	119—120½
108,075	,,	,,	5/17/3	6 5/16	Do. C.	110—115	100—105	...
140,865	,,	,,	—	6 5/16	New Ordinary	..	..	...
332,000	,,	,,	6½	7½	Wimbledon 5 p.c.	117—122	110—115	...
98,000	,,	,,	6½	7½	Epsom 5 p.c.	121—126	118—123	...
88,416	,,	June 28	3	3	3 p.c Deb. Stk.	66—69	57—60	57½—60

B.—Bristol Exchange. N.—Newcastle Exchange. S.—Sheffield Exchange. * Ex div.

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THE Corporation of Birkenhead are prepared to receive TENDERS for the Supply of approximately 15,000 Tons of SCREENED COAL, THROUGH and THROUGH COAL, NUTS, and SLACK, for Gas-Making purposes for the period ending June 30, 1924.

Forms of Tender, together with any further Information, may be obtained from the Gas Engineer, Gas-Works, Birkenhead.

Tenders, stating the price per Ton Delivered to the Gas Works Railway Siding, as per schedule embodied in Form of Tender, must be sent in to me, sealed and endorsed "Tender for Gas-Works Coal," not later than five o'clock in the afternoon of Monday, the 5th day of November, 1923.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
JAS. FEARNLEY,
Town Clerk.

Town Hall,
Birkenhead.
Oct. 19, 1923.

NEWBURY CORPORATION GAS UNDERTAKING.

INSTALLATION OF VERTICAL RETORTS.

THE Gas Committee of the Newbury Corporation invite the Submission of SCHEMES, with Tenders, for the installation at the Newbury Gas-Works of VERTICAL RETORTS capable of producing a daily minimum quantity of 350,000 c.ft. of gas of a calorific value of not less than 500 B.Th.U.

Full Particulars of the Requirements of the Corporation may be obtained from the Gas Engineer at the Gas-Works; and it is suggested that Competing Firms should Inspect the site of the proposed Installation before submitting Schemes.

Schemes containing all necessary Details, and accompanied by Tenders, should reach the undersigned, enclosed in an envelope endorsed "Installation of Vertical Retorts," not later than the 30th of November, 1923.

S. WIDDICOMBE,
Town Clerk.

Municipal Buildings,
Newbury,
Oct. 30, 1923.

URBAN DISTRICT COUNCIL OF DENTON.
(GAS DEPARTMENT.)

THE above Council invite Tenders for the Supply of SCREENED GAS COAL, COBBLES, and NUTS suitable for Vertical Retorts, to be Delivered in the Council's Gas Works' Siding at Denton, near Manchester, on the London, Midland, & Scottish Railway, as and when required by the Council during the SIX MONTHS ending Sept. 30, 1924.

Tenders, endorsed "Coal" should be sent in to the undersigned not later than the 3rd of November, 1923.

The Council do not bind themselves to accept the lowest or any Tender, nor to Purchase the whole quantity required from any one person tendering.

H. C. HANDLEY,
Engineer and Manager.

Gas Works,
Denton, near Manchester,
Oct. 16, 1923.

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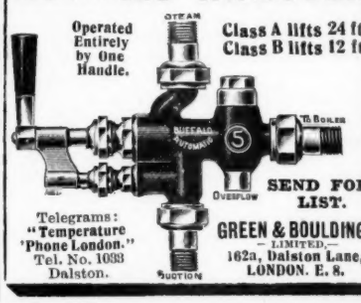

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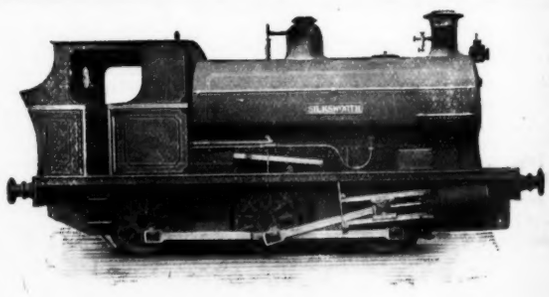

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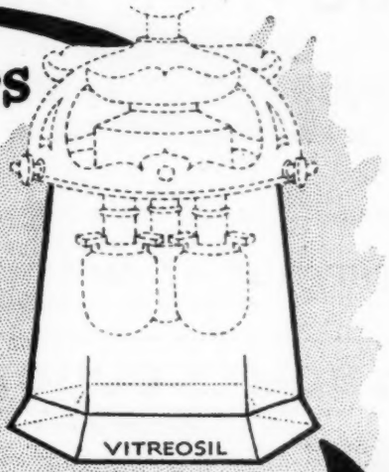

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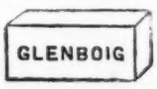
TRADE 

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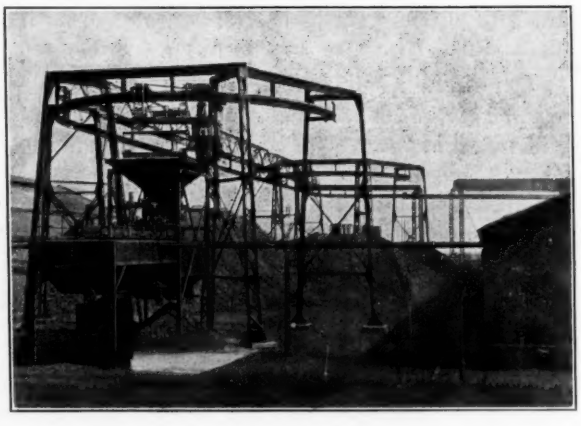

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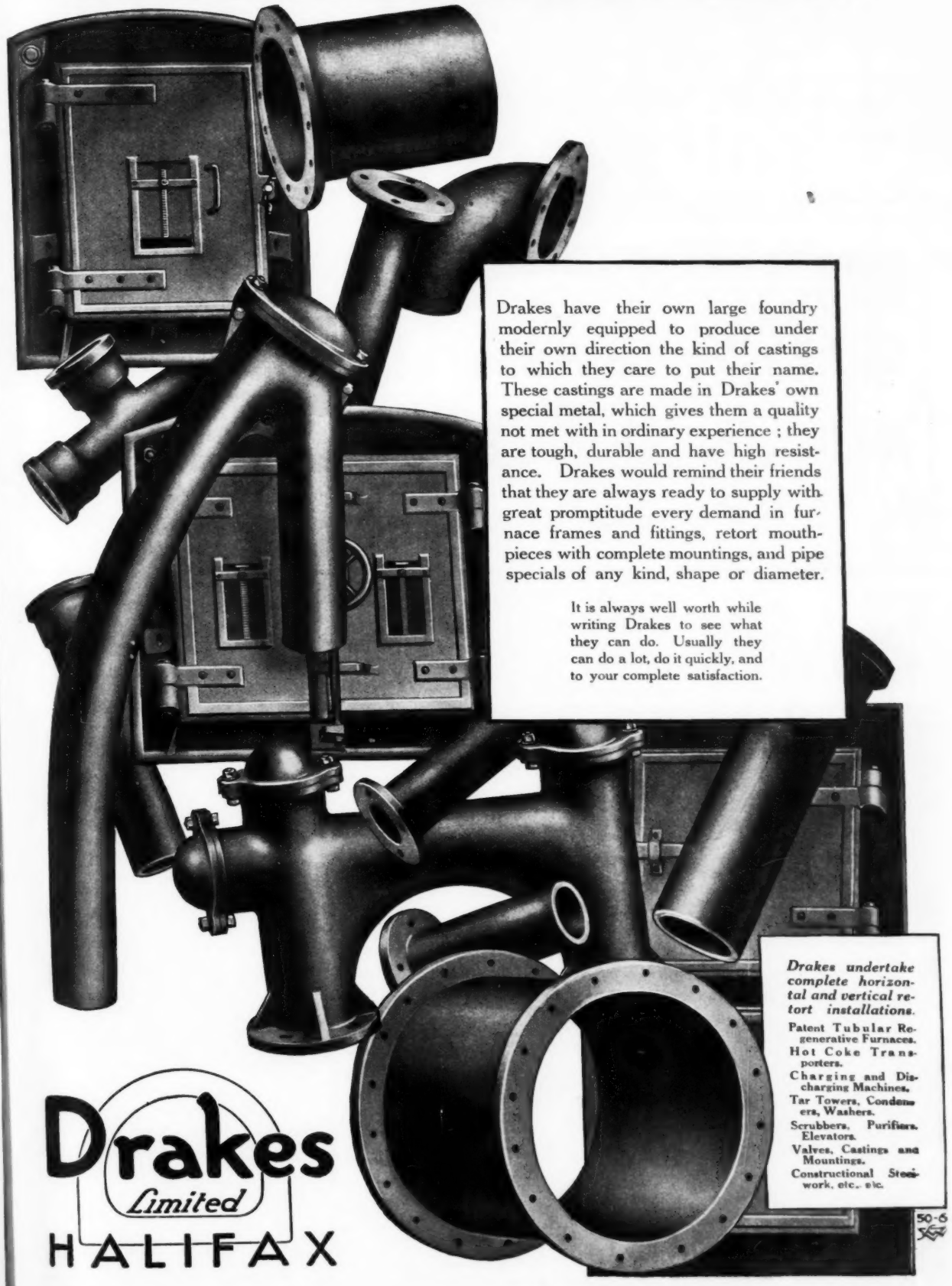

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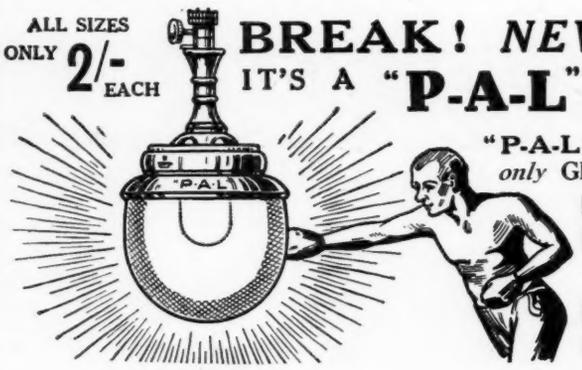

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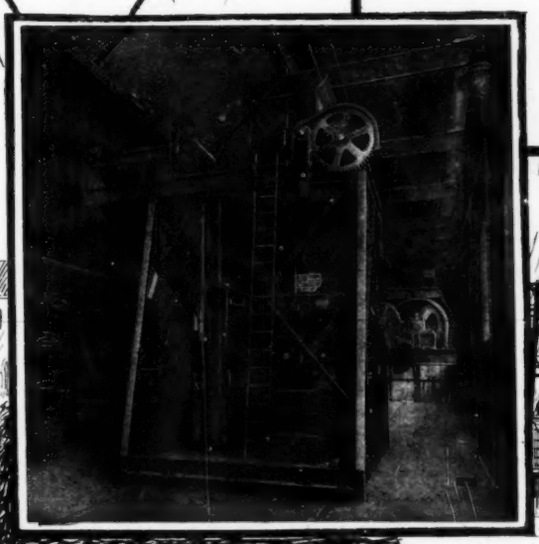

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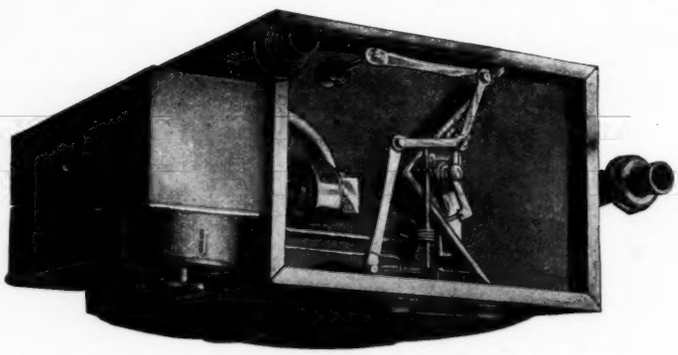

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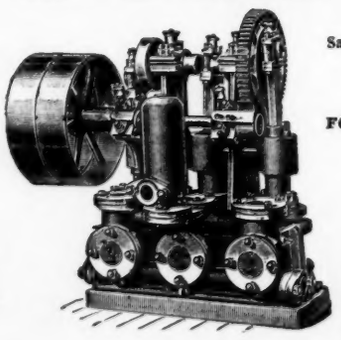

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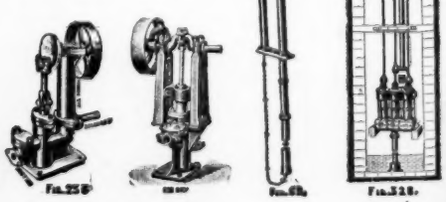

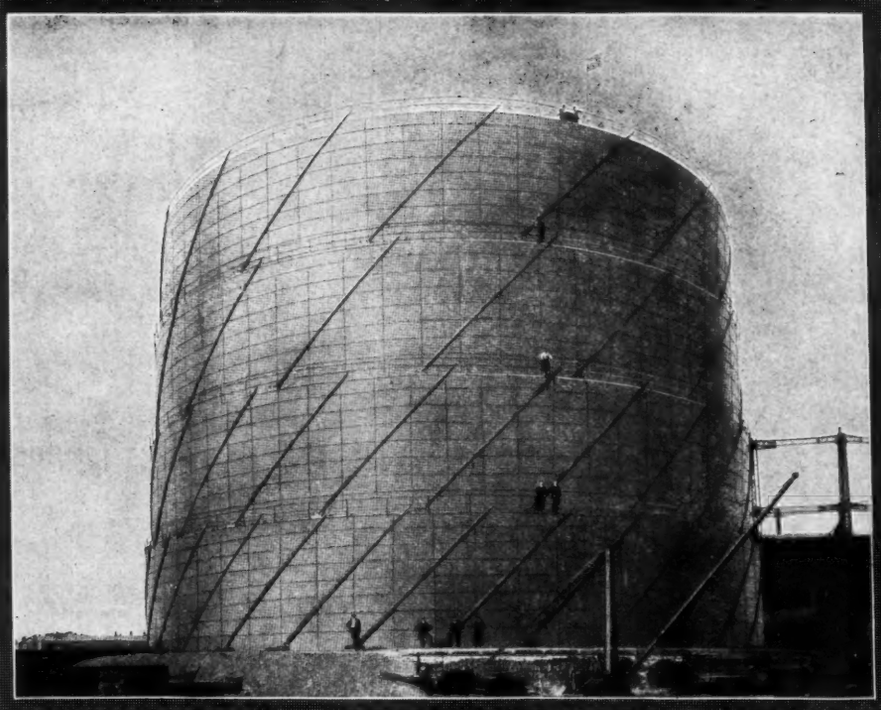

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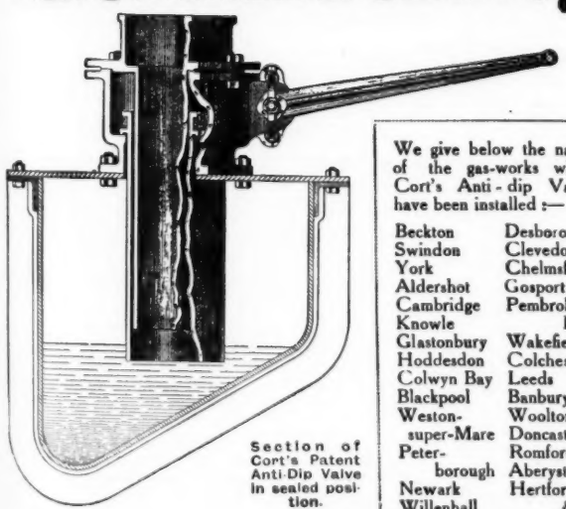

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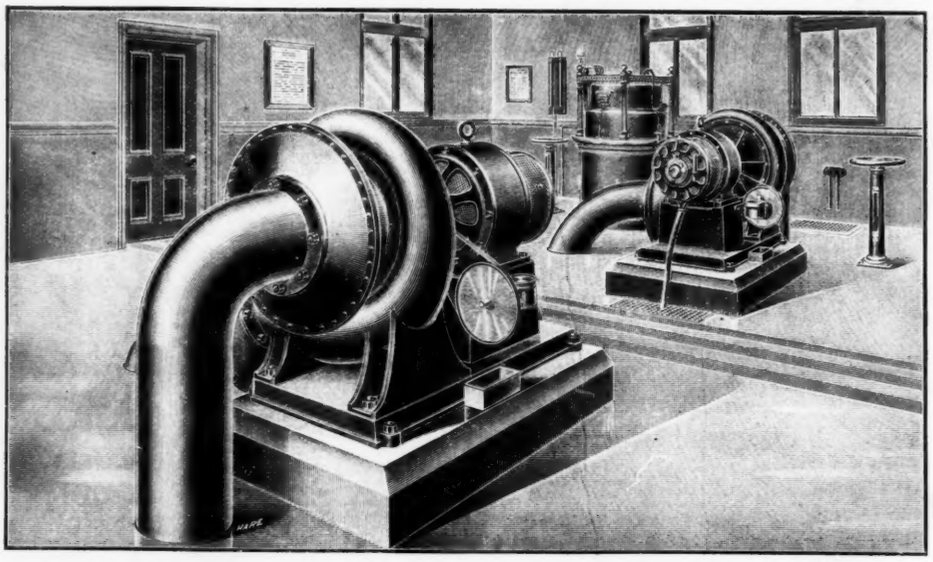

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